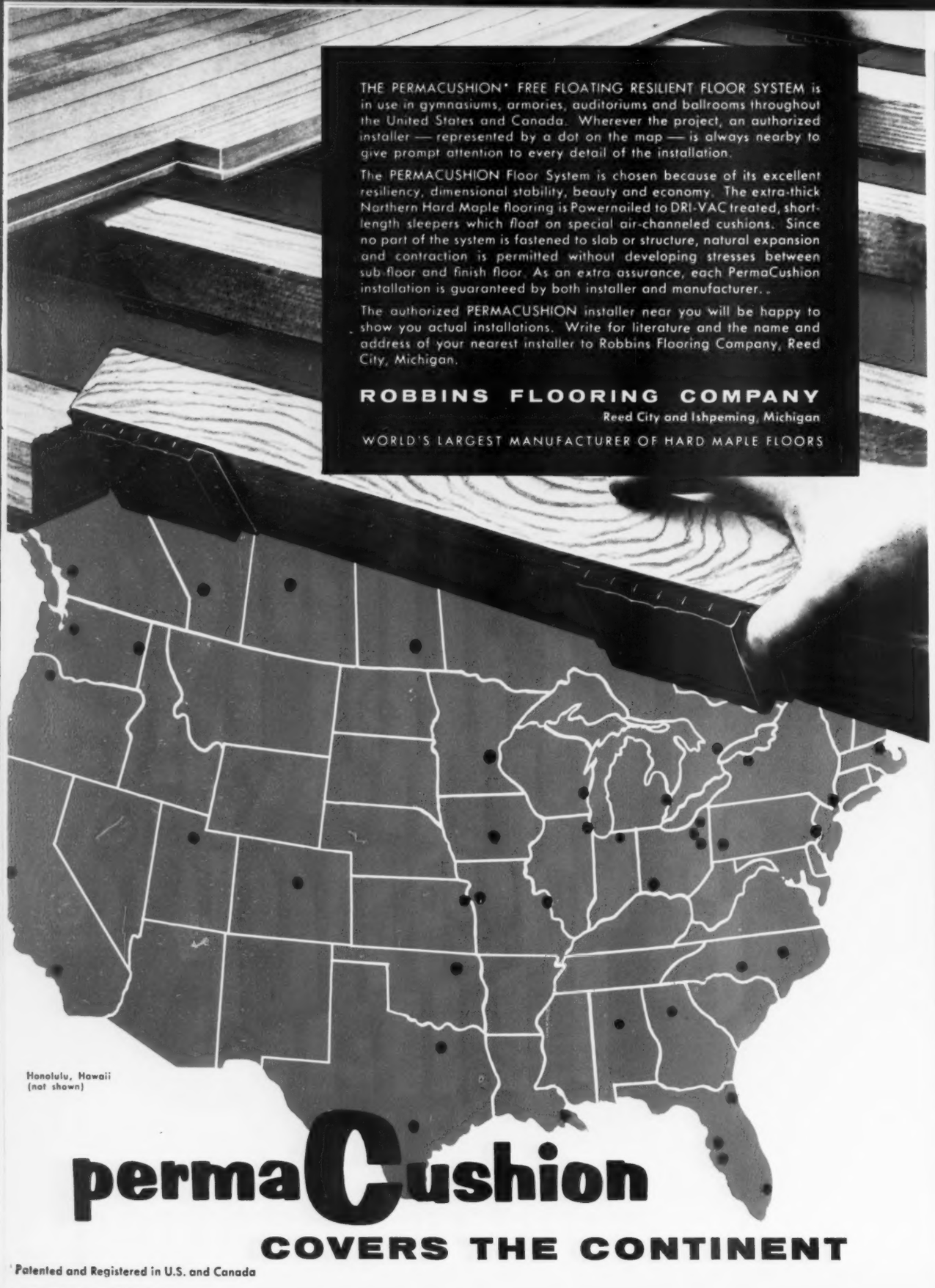
architectural
& engineering

NEWS

ARCHITECTURAL & ENGINEERING NEWS



THE PERMACUSHION* FREE FLOATING RESILIENT FLOOR SYSTEM is in use in gymnasiums, armories, auditoriums and ballrooms throughout the United States and Canada. Wherever the project, an authorized installer — represented by a dot on the map — is always nearby to give prompt attention to every detail of the installation.

The PERMACUSHION Floor System is chosen because of its excellent resiliency, dimensional stability, beauty and economy. The extra-thick Northern Hard Maple flooring is Powernailed to DRI-VAC treated, short-length sleepers which float on special air-channeled cushions. Since no part of the system is fastened to slab or structure, natural expansion and contraction is permitted without developing stresses between sub-floor and finish floor. As an extra assurance, each PermaCushion installation is guaranteed by both installer and manufacturer. .

The authorized PERMACUSHION installer near you will be happy to show you actual installations. Write for literature and the name and address of your nearest installer to Robbins Flooring Company, Reed City, Michigan.

ROBBINS FLOORING COMPANY

Reed City and Ishpeming, Michigan

WORLD'S LARGEST MANUFACTURER OF HARD MAPLE FLOORS

Honolulu, Hawaii (not shown)

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Architectural & Engineering News is published monthly by Hagan Publishing Corporation, 452 Fifth Avenue, New York 18, N.Y. Circulated without charge to Architects registered in the United States and licensed Professional Engineers designated by those architects as their consultants in the structural, mechanical, and electrical aspects of architecturally designed construction. Subscription to others: per year $10.00 U.S.A. and Canada; $25.00 in foreign countries; $1.00 per single copy, U.S.A. and Canada; $2.50 per single copy in foreign countries.

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BPA

Architects are emerging as a dynamic, new source for the creation and comprehension of the role that environment plays in American life. This issue, devoted to reinforcing the concepts and contributions of the "Expanding Horizons" theme of the 1960 AIA convention at San Francisco, salutes each and every one of the nation's architects on this occasion. Tony Palladino has found graphic inspiration in San Francisco's great and beautiful bay bridges for the cover design.

4

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72 **Editorial: expanding horizons**
9 **Forecast: the years ahead: 1960-1975**
15 **Environmental hygiene and architecture**
19 **Cost reduction methods for public housing**
24 **Acoustics: basic concepts in design**
27 **Architect's role in structures research**
30 **Architectural reseach & sociology**
2 **Gazette**
4 **Communications**
10 **A/E news**
39 **Products, equipment, materials**
54 **Literature**
64 **Documents**
65 **Preview: 16/New Brunswick housing for elderly**
66 **Books: Mies van der Rohe**
69 **Abstracts: Kling/next decade in building**
73 **Digest: 16/NBS research on metals**
76 **Names: Ludwig Mies van der Rohe, FAIA**
81 **Calendar**
80 **Index to advertisers**
Readers service cards
facing 1 and 80

ERRATUM:

The article by Allen Pond appearing on page 15 of this issue should be correctly entitled, "Environmental Hygiene and It's Meaning for Architecture."

GAZETTE

Robert S. Tobin, AIA, and George S. Dolim, AIA, elected to board of directors of Hertzka & Knowles, Inc., architectural firm of San Francisco, Calif.

Ralph A. Larsen, PE, appointed chief design engineer of Stone & Webster Engineering Corp., Boston, Mass.

Charles Luckman, AIA, appointed to governor's commission on metropolitan area problems by California Governor Edmund G. Brown.

William R. Smith named director of co-operative education at Illinois Institute of Technology, Chicago, Ill.

Dr. Donald R. Martin named director of research by Libby-Owens-Ford Glass Co., Toledo, Ohio.

Carl E. Asbury appointed chief electrical engineer of Commonwealth Associates Inc., Jackson, Mich.

Daniel D. Wile, PE. assumed presidency of *American Society of Heating. Refrigerating and Air-Conditioning Engineers.*

A. Quincy Jones, AIA, elected president of Southern California chapter of *American Institute of Architects.* Other officers include: C. Day Woodford, AIA, vice president; Clinton Ternstrom, AIA, secretary; James Mount, AIA, treasurer. Elected as directors were: Maynard Lyndon, FAIA; Howard Morgridge, AIA; Edward Fickett, AIA; Arthur B. Gallion, FAIA; Herman Ruhnau, AIA; and Delma Daniel, AIA.

Carl Thaller, PE, named associate of Samborn, Steketee and Associates, Otis & Evans, consulting engineers and architects, Toledo, Ohio.

F. Crampton Frost named to administrative staff of *American Standards Assn.* His energies will be devoted to membership development.

Benjamin L. Page appointed chief of Length Section, Optics and Metrology Div., *National Bureau of Standards.*

Richard H. Tatlow III, PE, of New York, elected president of the *American Institute of Consulting Engineers.*

Frederic P. Wiedersum, AIA, senior partner of Frederic P. Wiedersum Associates, architects and engineers, has inaugurated a $500 award, known as the Frederick P. Wiedersum Grant, to be presented annually to an upper class student of the School of Architecture at Pratt Institute, Brooklyn, N. Y.

Dr. Jaroslav Joseph Polivka, renowned civil engineer and authority on structural design, died at age 73, of cancer.

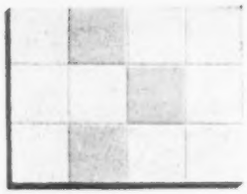
Suntile helps you create

IN WALL TILE

New Setfast* Mounted Stock Pattern Insets

(in 4¼ x 4¼, 4¼ x 6, 6 x 6 and 4¼ x 8½" tiles)

add interest to any wall



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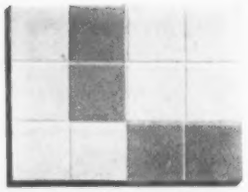

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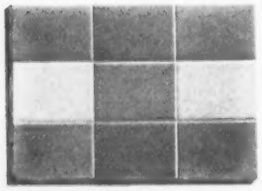

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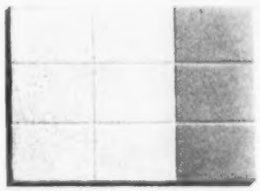

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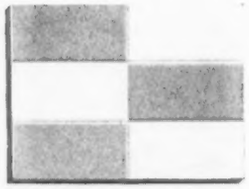

Pattern No. 84-B

Here's a group of new contemporary design patterns in ceramic wall tile that should excite the imagination of every creative designer.

Each of these new basic pattern insets can be secured in wall tiles of any standard size and in a wide variety of colors that will harmonize with or accent your basic background color. What's more, because these units are "Setfast"* mounted they can be installed easier and faster.

Set within a background field of any of Suntile's palette of 35 standard colors, they enable you to create a wide variety of interesting wall treatments. Only a few of the many design possibilities offered by these basic patterns are shown here.

For guaranteed installation by skilled craftsmen, call your Authorized Suntile Dealer. His name is listed in the "Yellow Pages" of your phone book. For folder showing the complete selection of our new stock pattern insets, write to Dept. S-AE.

* Patent #2,887,867 – other patents pending

*Suntile's Patented** SETFAST MOUNTING
– simplifies tile setting – saves time and money

SETFAST is the patented development of The Cambridge Tile Co. It has proved itself in thousands of installations to be the easiest, fastest and most economical method of installing wall tile or floor tile. Goes right over existing walls. Can be used with approved adhesives or self-curing mortar in thin-set installations. All tiles are perfectly spaced at the factory. No paper to soak off, no mess to clean. Because it's installed face up, errors are avoided, tile setter can inspect his work as he goes along.

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NEW IMAGINATIVE DESIGNS

IN FLOOR TILE

Custom Design
No. 6538-S

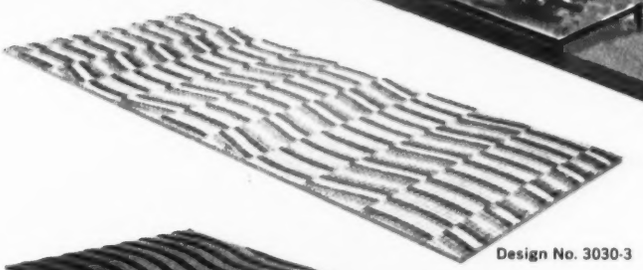
it's **new**... it's **original**...
it's SERPENTINE
by **Suntile**

If you're looking for something different, something distinctive in a ceramic tile floor design—here it is—Suntile's new SERPENTINE pattern.

This intriguing new design is no optical illusion. Through a new method developed by Cambridge the tiles (1" x 1" or 2" x 2") are actually set in an interesting serpentine pattern that offers a new originality never available before.

With Suntile's special "Setfast"* mounting, it is possible to set precision mounted 2 foot sheets of tile with greater ease than ever before. This new method not only saves installation time but gives a uniform hand-set appearance to your SERPENTINE floor.

SERPENTINE pattern units are available in solid colors or interesting multi-color combinations that lend themselves to many attractive over-all floor patterns. Pictured here are but a few of the interesting design effects you can achieve with this new SERPENTINE pattern. For special folder showing additional SERPENTINE patterns, write today. Address Dept. S-AE.



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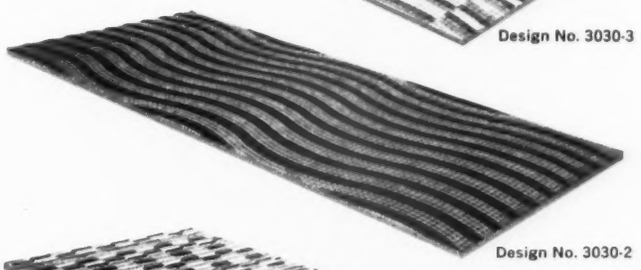

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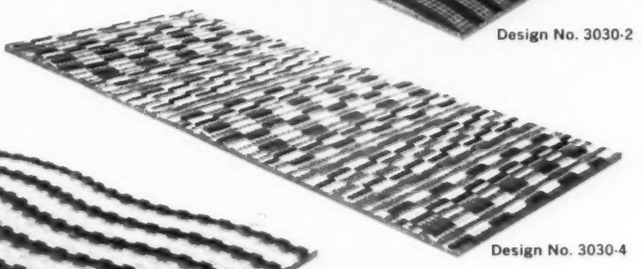

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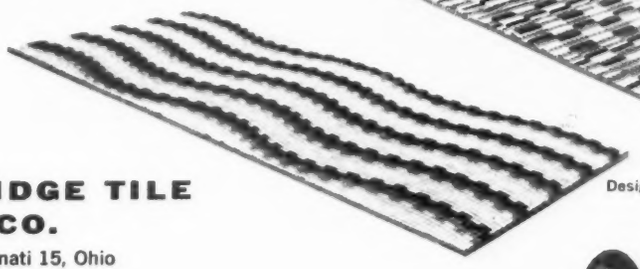


Design No. 3030-5

THE CAMBRIDGE TILE MFG. CO.
P.O. Box 71, Cincinnati 15, Ohio

Suntile's DESIGN SERVICE DEPARTMENT
is ready to serve you, without obligation!

Our design staff under the direction of George Limke is always ready to assist you with your tile design or layout problems. Working from your elevations or plans, and with your design requirements in mind, they will gladly develop suggestions for tile applications in any area or translate your design concepts into accurate layouts. Just send us your elevations, plans or sketches for tile installations and we'll submit drawings for your consideration. There is no obligation. Address Dept. D-AE.

GAZETTE

David R. Countryman, Civil Engineer, named to newly-created position of manager of Research and Engineering for Douglas Fir Plywood Assn.

John James Carlos, AIA, Architect and Editor of this publication, awarded the $3,000 annual Arnold W. Brunner Scholarship of the New York Chapter AIA. Scholarship also awarded $1,000 to Harold Edelman and Stanley Salzman, Associate Professors of Architecture at Pratt Institute, for completion of their book on principles of architectural composition.

Robert Carson, FAIA, member of firm of Carson and Lundin, resident architect for Rockefeller Center, Inc., died March 1.

Fred Ervin, Engineer, has joined architect-engineering firm of Engineering Service Corp. of Los Angeles as division engineer in charge of planning and design.

A. Roger Kelly, PE, appointed associate and manager of New York office of Fred S. Dubin Associates, Consulting Engineers, of New York, Boston, Hartford, St. Louis and San Juan.

John T. Pinkston, PE, elected vice president of United Engineers & Constructors, Inc., Philadelphia, Pa.

Arthur J. Benline, Registered Architect and Professional Engineer, recently sworn in as Commissioner of New York City Department of Air Pollution Control, by Mayor Robert F. Wagner.

Harold D. Hauf, AIA, Dean of School of Architecture, Rensselaer Polytechnic Institute, was member of instruction staff for Fourth Producers Council Institute at University of Florida, Gainesville.

Paul O. Davis, AIA, elected 1960 president of California State Board of Architectural Examiners.

Arthur M. Lockie, PE, made Fellow of AIEE for contributions to "thermal analysis of performance and life of loaded distribution transformers."

Wayne S. Hertzka, AIA, elected 1960 president of California Council, AIA.

Harlow J. Reed, holder of degree in electrochemical engineering from Massachusetts Institute of Technology, appointed vice-president for engineering of Olin Mathieson Chemical Corp.

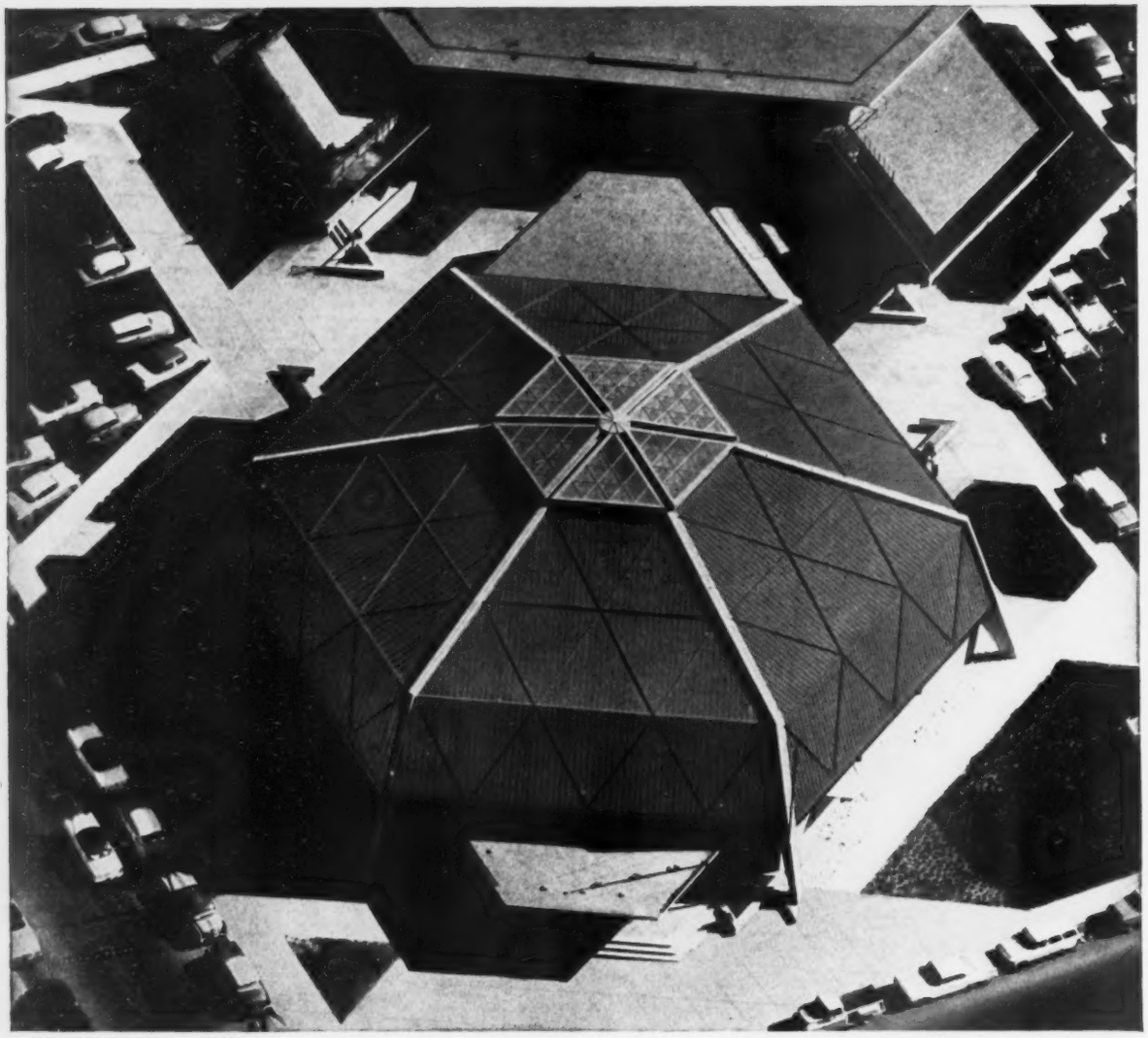
Office announcements

Ted Arthur Homa, AIA, to 25 West 43 St., New York, N.Y.

New York office of Fred S. Dubin Associates, Consulting Engineers to 7 East 47 St., New York.

Harold Keeney, Jr., Architect, to 18043 Bothell Way N. E., Bothell, Wash.

← Circle 101 for further information



Copper gives lasting beauty to outstanding design

Whether viewed from ground level or from nearby Golden Gate Bridge, the copper roof of the Longshoremen's Memorial Building in San Francisco contributes much to the modern architecture of the structure.

Although each segment of the hexagonal mansard roof appears to consist of fifteen separate triangular roof areas, actually the standing seam copper roof is continuous on each slope between the concrete bents. The diagonal copper battens which create the pattern are above the standing seams.

Economy Copper Roofing, an Anaconda product, was selected because it provides a lasting and beautiful roof covering at savings in material and installation costs. Weighing 10 ounces per sq. ft., the standard sheets 16" x 72" are easy to handle and eliminate waste in forming roof pans of desirable dimensions.

Write for our "Modern Sheet Copper Practices"—109 pages of drawings, specifications and general information on copper sheet metal work. The American Brass Company, Waterbury 20, Conn. 6019

Circle 102 for further information

Memorial Building of the International Longshoremen's and Warehousemen's Union, San Francisco. ARCHITECT: Henry Hill, San Francisco. The dome is sheathed with about 18,000 sq. ft. of Economy Copper Roofing installed by Fire Protection Products Co., San Francisco.

Economy Copper Roofing

an ANACONDA® product

made by The American Brass Company

COMMUNICATIONS

Letters should be addressed to: Editor, Architectural and Engineering News 452 Fifth Ave., N. Y. 18.

Editor:

As I have mentioned before to you, A/E NEWS is wonderful for us and each month a card goes out with at least 10 of its numbers circled. Such a good service! I find the technical articles better than the big magazines'.

Again our appreciation.

Sincerely,
Henry Steinhardt, AIA
Steinhardt & Thompson, Architects
New York, N. Y.

Editor:

Can you furnish the address of the *Consulting Engineers Council*, mentioned in the February issue, for the purpose of obtaining a copy of their brochure, "Framework For The Future," also featured in your news story?

Yours truly,
Victor M. Villemain, RA
New York, N. Y.

Editor's note: *Inquiries concerning this brochure should be directed to Mr. Larry N. Spiller, Executive Secretary, Consulting Engineers Council, 326 Reisch Building, Springfield, Ill.*

Editor:

Please place my name upon the circulation list of Architectural & Engineering News. I am a mechanical engineer . . . actively engaged in the design of banks, schools and offices. Since we mechanical, civil and electrical engineers provide between 60 and 90 per cent of the design of a commercial type building, we appreciate 40 to 10 per cent which the architects contribute in the facade of these structures.

Very truly yours,
Donavan A. Thorp, PE
Commonwealth Associates, Inc.
Jackson, Mich.

FDR memorial competition

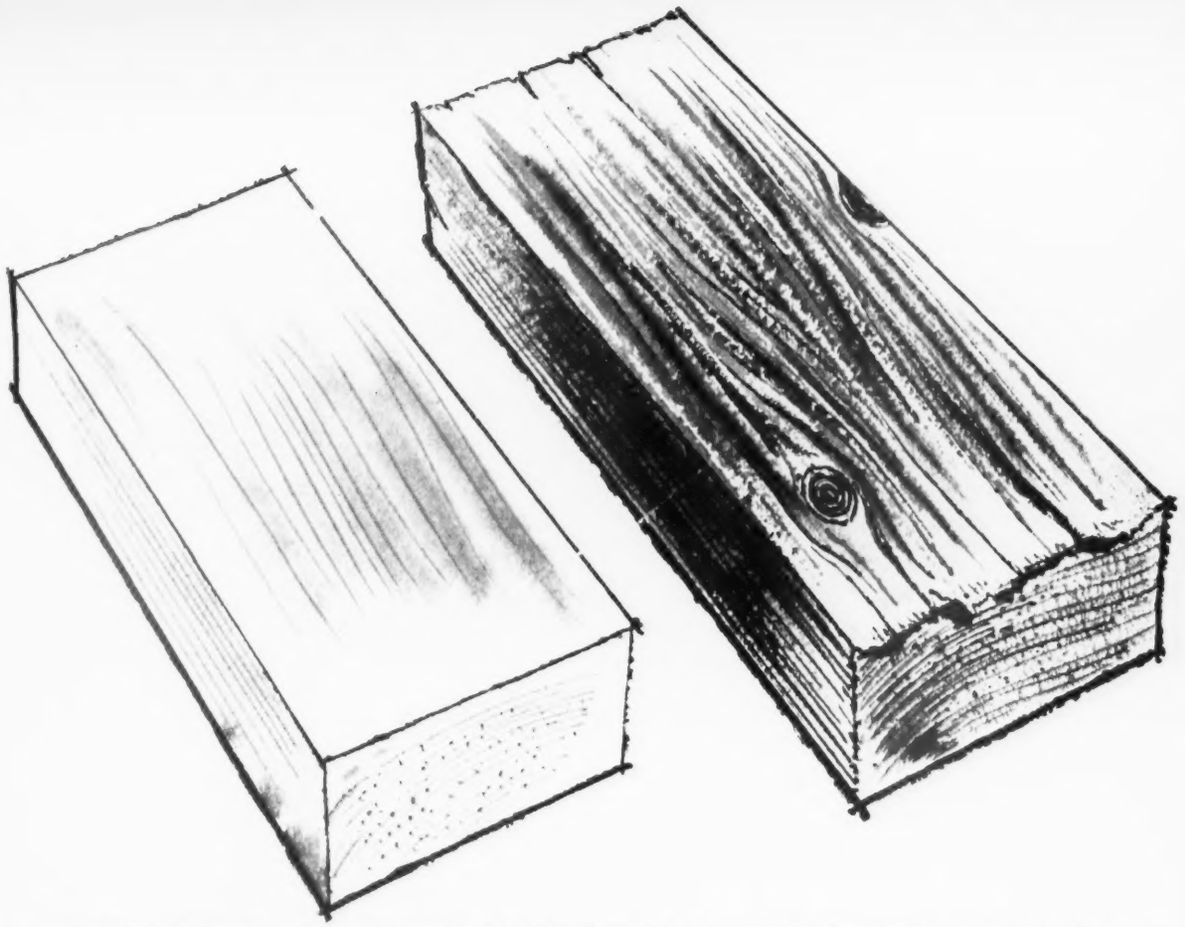
Dear Mr. Carlos:

The enclosed information on the Franklin Delano Roosevelt Memorial Competition probably will be of interest to you . . .

Sincerely,
Edmund N. Bacon
Professional Adviser

Editor's reply: *Mr. Bacon's letter arrived too late for inclusion in our A/E NEWS section. Therefore, we would like to give details of the competition via this column. First and most important, registration forms should be filed before April 25th. The competition is a 2-stage program open to registered architects or to associations of others, provided an RA is part of the team. All contestants must be U.S. residents. Second stage is limited to 6 competitors selected by jury. Each of 6 finalists receive $10,000. Prize for second stage winner is $50,000. More details may be had from Mr. Bacon c/o FDR Memorial Competition, 108-112 Tariff Commission Bldg., Wash. 25, D.C.*

Circle 104 for further information about DAY-BRITE LIGHTING—pp 6-7 →



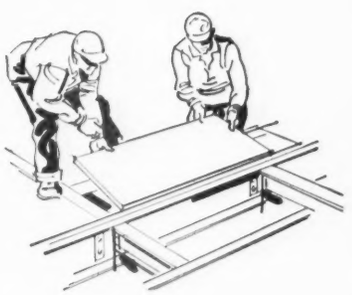
THERE IS A MATERIAL DIFFERENCE

And the lumber industry has made selection easier for you through approved standards of grading. You expect the best grade to cost a little more because *you get more for your money*. Grade 1 looks better, has greater strength and provides better service for a longer time.

If roof deck materials were graded for quality, less confusion would result from their surface similarities. Tectum® stands alone in its class. It is the only preformed wood fiber board which uses a continuous process; a rapid, chemical reaction process utilizing a specially formulated binder naturally compatible with wood fibers. This exclusive binder makes possible the use of machine automation—a manufacturing process that assures a uniform, quality product through close process control.

All other manufacturers of this type roof deck use a process which requires that the fibers be chemically treated prior to mixing with the binder. This treatment reduces to a great extent the high tensile strength of natural wood fibers.

Tectum is the only product of this type that retains the live strength of tough wood fibers to provide high secondary strength. Tectum is tougher, yet lighter in weight, and has great resistance to impact and abuse. And Tectum is Fiberguard® protected with specially formulated silicones for effective water repellency.



Ask to see Tectum's new movie, "Building the Future with Tectum"

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Tectum®

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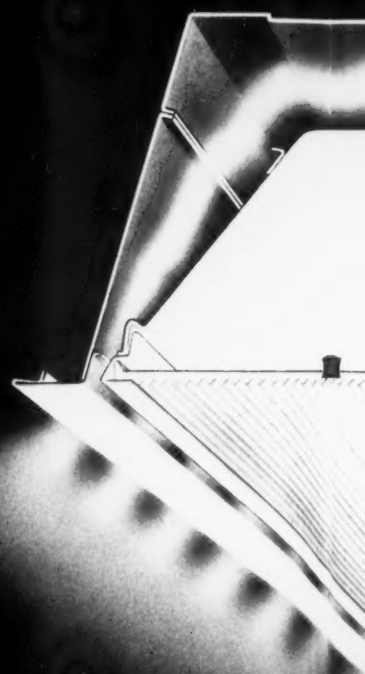
Comfort Conditioning . . . with Light and Air . . . is the result of the combined research and engineering know-how of Day-Brite Lighting, Inc. and the Barber-Colman Company.

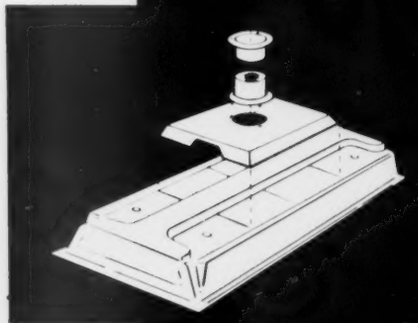
The successful blending of these two prime comfort factors, provides the much needed solution to a growing problem in interior design . . . the competition between acoustical material, air distribution, and lighting elements.

Trim, functional design, combined with the finest in comfort lighting and air distribution.

Two basic sizes, 12" x 48" and 24" x 48" . . . a wide choice of lighting enclosures . . . louvers, plastic, glass . . . supply or return . . . compatible with all basic ceiling systems.

Units can be used individually or in combination with lighting fixtures equipped with matching enclosing elements.





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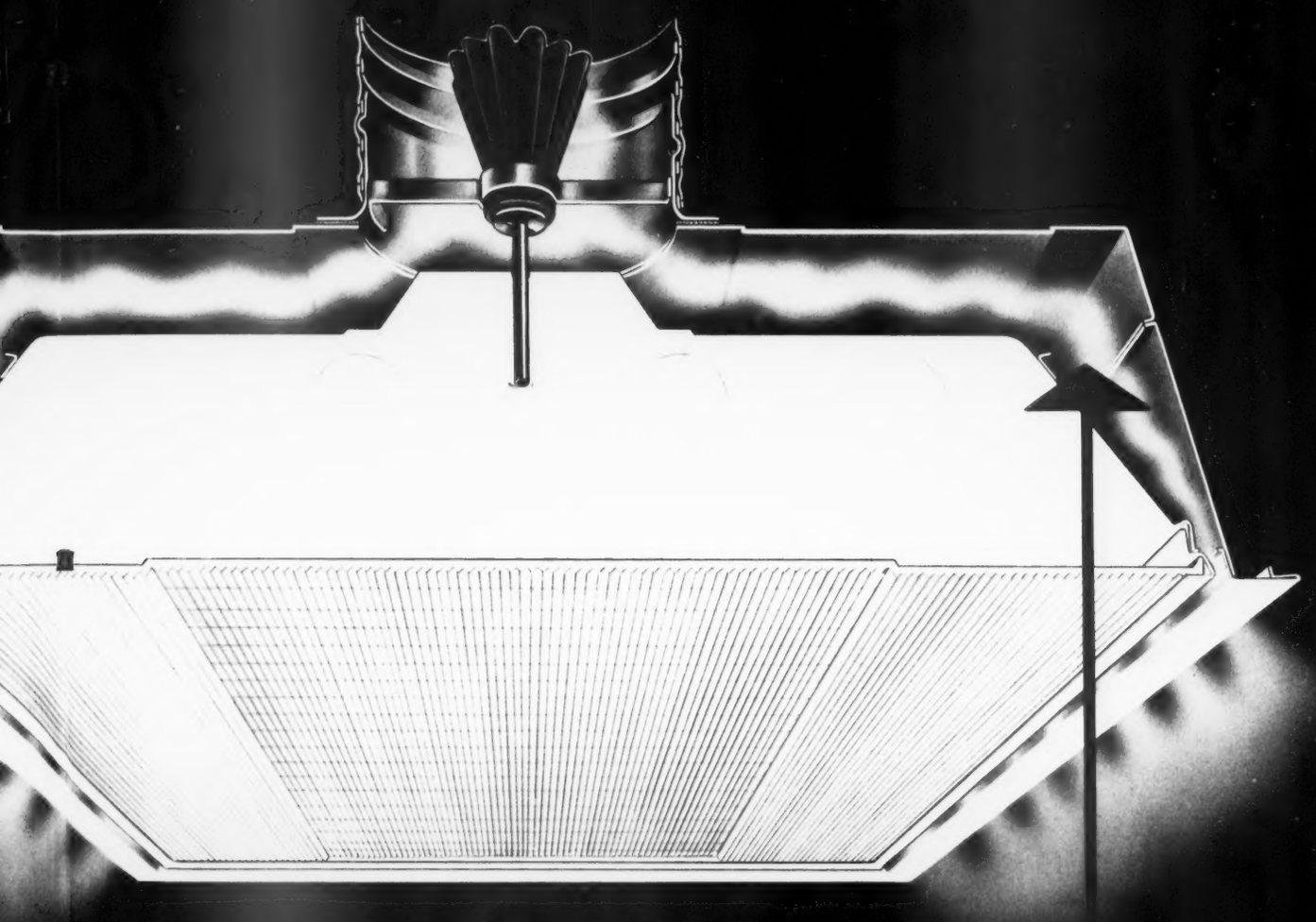
ST. LOUIS, MO., SANTA CLARA, CAL.

TWO GREAT NAMES IN ENGINEERED LIGHTING AND AIR DISTRIBUTION.



PATENTED* DOUBLE WALL CONSTRUCTION

Air passes through separate chamber completely isolated from fluorescent lamps. Stabilized light output . . . Unequalled in-service performance . . . No reduction in luminous area.

For complete selection and application data, write today for your copy of the new 24-page book "Comfort Conditioning with Light and Air". . . Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo. or Barber-Colman Co., Dept. B, 1101 Rock Street, Rockford, Illinois.

*Patent No. 2564334, other patents pending.

NEW

AS TOMORROW'S BUILDINGS

The superbly engineered new Oasis On-A-Wall wall-hung Water Cooler is elegantly styled for modern architecture.

Because it's off the floor, the Oasis On-A-Wall is easy to clean around. It's flush with the wall to save space and conceal plumbing.

With its crisp, modern look, the On-A-Wall is the first water cooler to have a cabinet of 20 gauge steel with mar-resistant Vinyl Laminate exterior finish of Silver Spice color. Recessed anodized aluminum grille has an ultra-modern basketweave pattern.

Easily mounted, the On-A-Wall has a stainless steel top, deep basin with anti-splash ridge, and the highest anti-splash back of any wall-hung cooler. It is available in two capacities—7 and 13 GPH.

Write today for attractive album prepared especially for architects and engineers. It has specifications and roughing-in drawings for the complete Oasis line of water coolers, including the versatile In-A-Wall that fits in an 8" wall. Or look in Sweet's AIA File No. 29-D-42.

Yes, you can specify Oasis with the utmost confidence because Oasis engineering has the finest record of trouble-free performance in the industry.

OASIS WATER COOLERS

The Ebco Manufacturing Co., Dept. 6-P, Columbus 13, Ohio

Manufacturers of the most complete line of water coolers. Distributed in Canada by G. H. Wood & Co., Ltd.

Circle 105 for further information

THE YEARS AHEAD/1960 TO 1975

From a report issued by American-Marietta Co., based on a year-long independent study to project the nation's economic outlook.*

A doubling of the American economy; a nation one-third larger in consumers, 50 per cent richer per consumer; demands for electricity almost triple today's requirements; total purchasing power of families with incomes over $10,000 equalling today's entire consumer market—these are the broad dimensions to be realized by the U.S. economy by 1975.

This special one-year economic study explores the motivating forces which lie behind the vast expansion that is anticipated in the next 15 years. The report puts the analytical spotlight of economic research upon three salient factors: *(1) a continuing and rapid increase in population; (2) a new and greater period of construction that will dwarf the post-war building boom; and (3) an era of unprecedented technological progress.*

Here are some of the major conclusions forecast in this report. All historic data is expressed in terms of 1959 dollars.

The economy as a whole: In all measures of output, the economy of 1975 will be nearly the equivalent of two American economies of today. The gross national product—the value of all goods and services produced—now totals approximately $480 billion a year. By 1975, the gross national product will reach $925 billion, measured—it is important to note—in terms of today's dollar.

Family income: On the average, the American family now earns $6,480 a year. By 1975, this average will have increased at least 50 per cent—to an average of $9,400 a year, again measured in terms of today's dollar.

In 15 years, a full third of the 70 million American families will earn $10,000 or more a year.

Population

Since World War II, the population increase has exceeded the total increase for the 1920's, the 1930's, and half of the 1940's. Births will continue to increase, reaching an annual rate of 5,900,000 by 1975, compared with 4,280,000 at present. The nation's total population will rise by 55 million—from an estimated 180,126,000 persons in 1960 to 235,246,000 in 1975.

Consumer market: The population increase will mean that for every three consumers in the market today, there will be four by 1975. As a special market stimulus, the number of young adults between the ages of 18 and 24 will have increased 70 per cent, to a total of 27.5 million in 1975. As examples of the importance of this age bracket, study notes that young married couples spend 27 per cent more than the national average for automobiles and 75 per cent more than the average for television sets and furniture.

The market for essentials: Today, the essentials of food, clothing, and shelter account for $165 billion of annual consumer spending. By 1975, this market for essentials will have grown to $274 billion a year, an increase of nearly 70 per cent.

The market for discretionary items: At present, $145 billion a year is spent by consumers for discretionary items, such as personal and medical care, appliances, recreation, and luxuries. In the next 15 years, this spending will increase 107 per cent to over $300 billion a year.

Construction

By 1975, the annual expenditures for new construction, maintenance and repair will total $137 billion.

Need for new homes: More houses must be built in the next 15 years than in the last 30 years. The next 15 years will require the construction of 22 million houses, and suburban home building alone will represent $400 billion in construction.

Construction for business and industry: In 1960, industry and business, including public utilities, will spend an estimated $36 billion for new plants and equipment. By 1975, this outlay will have increased to $66.7 billion annually.

Roadbuilding: A continuous increase in the number of automobiles will require accelerated highway construction programs. In the last 12 years, the number of automobiles has doubled, but highway miles have been increased only 4 per cent since World War II. Fifteen years from now, there will be 111 million motor vehicles in use, compared with 71 million today. In 1975, $11.3 billion will be spent on highway construction.

During the next 15 years, our economic growth will require spending the enormous sum of $1,540 billion for construction materials, services, and labor, according to the report. "In itself, this will constitute one of the major forces of growth within the economy."

Technology

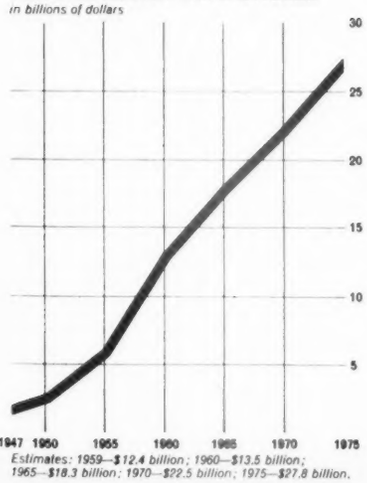
Of the economy's third major driving force—technology—the study concludes: "Every indication points to the fact that this age of technological discovery has just begun."

During 1975, research expenditures will total $27.8 billion, compared with $13.5 billion in 1960. In the next 15 years, American business and government will spend more than $250 billion just to discover and perfect new products and processes.

"This huge effort—itself only a portion of a world-wide scientific exploration—represents the greatest organized assault upon the unknown that society has ever undertaken."

The report includes projections of growth of several specific industries. Among them are paint, varnish and lacquer, fir plywood, paper and paperboard production, electric power, public sewer and water projects, textile sales, and Portland cement, for which a doubling of demand is forecast.

TOTAL RESEARCH EXPENDITURES
in billions of dollars



Estimates: 1959—$12.4 billion; 1960—$13.5 billion; 1965—$18.3 billion; 1970—$22.5 billion; 1975—$27.8 billion.

**Copies of the report, "The Years Ahead: 1960 to 1975," may be obtained from the Department of Information, American-Marietta Co., 101 E. Ontario St., Chicago, Ill. Sources for the historical economic data in the report: U. S. Department of Commerce; U. S. Department of Labor; U. S. Department of the Interior; U. S. Department of Defense; Federal Power Commission; Board of Governors of the Federal Reserve System; Securities and Exchange Commission; U. S. Atomic Energy Commission; Aviation Facilities Planning Commission; Douglas Fir Plywood Assn.; McGraw-Hill Department of Economics; National Science Foundation; Associated General Contractors of America; Chamber of Commerce of the U. S.; F. W. Dodge Corp.; National Assn. of Home Builders; and Portland Cement Assn.*

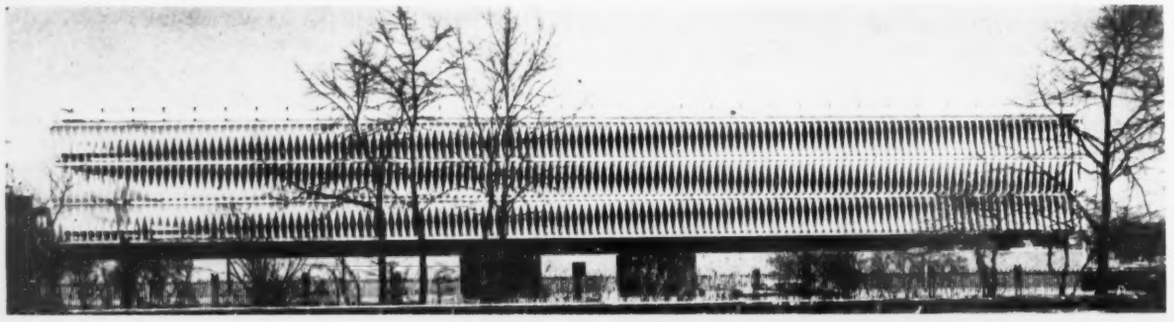
← Circle 104 for further information

About DAY-BRITE LIGHTING—pp 6-7

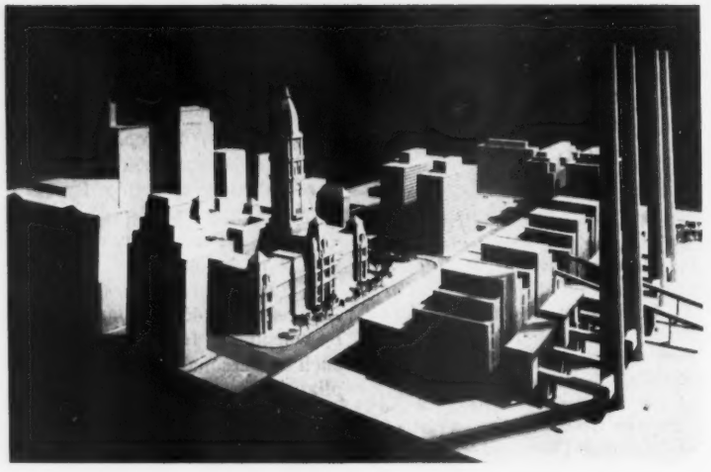
Washington Technological Associates, Inc., of Rockville, Maryland announce the acquisition of a 76-acre site for a $3 million engineering research and development center to be built in 3 units: The first will house administrative and engineering offices, drafting rooms, shops and testing and research laboratories; Second features "lift-slab" construction for its six floors; Third unit will be of folded plate concrete construction. Architect: Donald N. Coupard, AIA of Rinaudot and Coupard, Bethesda, Maryland. (Photo: Davis Studio)

Indiana University's new $4.5 million stadium at Bloomington will feature a three-deck press "box" of glass and aluminum. The press box will perch 160 feet above the field and extend approximately 150 in width. The 3-level press facility, is served by its own elevator and it will accommodate newsmen on the first floor, radio-TV newcasters on the second and TV and still cameramen on the third. Architects are Eggers and Higgins, New York City, in association with E. P. Bardwell, Indiana University architect.

A|E NEWS



More than 1700 precast, hyperbolic-paraboloid-shaped concrete panels were used to create the exterior screen of the new 870-car parking facility at Henry Ford Hospital (above). This project, selected for exhibit in London, England, was built at a cost of $3.70 per square foot. Architects and Engineers: Albert Kahn Associated Architects and Engineers, Inc., Detroit. Architect's models (photo right), built to same scale, compare Paradise, Kentucky Steam Plant with Philadelphia's City Hall. The mammoth steam plant, to be built by TVA, will house largest turbo-generator in history, with an output of 600,000 kilowatts. Vincent G. Kling, FAIA, Philadelphia architect has been named design consultant to TVA on Paradise Plant. (Photo: Lawrence S. Williams)



AIA portfolio

This year's annual convention of *The American Institute of Architects*, being held April 18 to 22 at San Francisco, will bring together over three thousand architects and their guests from all parts of the country. Among well-known authorities in science and the humanities to be heard by the AIA conferees will be J. Robert Oppenheimer, director of the Princeton Institute of Advanced Studies and Cyril Northcote Parkinson, historian and author of *Parkinson's Law*.

Under the general theme, "Expanding Horizons", the architects will explore the trend of political, economic, technological and philosophical developments so as to assist the profession to keep abreast of changes in human needs and environment.

Oppenheimer's and Parkinson's speeches and those of philosopher Morton Gabriel White of Harvard and sociologist Wendell Bell of the University of California will be related to architecture by panels of outstanding architects.

The panel discussions and business meetings of the convention are being held at San Francisco's new Masonic Temple. Convention headquarters are at the Mark Hopkins Hotel on Nob Hill. The convention program also features the ceremonial investiture of 44 newly-elected fellows of the AIA and a president's reception both at San Francisco's famous City Hall.

The coveted Gold Medal of the institute will be presented to Ludwig Mies van der Rohe, FAIA, world famous architect and retired director of the Department of Architecture and City Planning of the Illinois Institute of Technology. (See *NAMES* this issue.) The presentation will be made during the course of the annual dinner to be held in the regal setting of the Garden Court of the world-famous Palace Hotel.

During April, the San Francisco Museum of Art will show a comprehensive exhibition of the work of LeCorbusier, world famous architect, planner, painter and sculptor. This exhibit, designed and arranged in Switzerland, is receiving an exclusive showing in this country at this time prior to its travel to Tokyo where it will be shown in LeCorbusier's newly completed Museum of Western Art. Announcement of the winners of the *R. S. Reynolds Memorial Award* (99 nominations), the *Homes for Better Living Awards*, and other awards will be made at morning sessions.

The directors of the Institute have created a new annual award for architectural photography and elected Roger Sturtevant of San Francisco its first recipient.

The winner of the *AIA Fine Arts Medal for 1960*, is Thomas Hart Benton of Kansas City, Mo., the well-known painter who has achieved considerable fame with his heroically realistic presentation of American life on murals for many public and private buildings. The *AIA Craftsmanship Medal* is being awarded to William L. DeMatteo, a silversmith who practices his ancient craft in Colonial Williamsburg, Va.

The convention program has been worked out by a committee of the Northern California Chapter, AIA, under the chairmanship of Donn Emmons. A sub-committee headed by John Lyon Reid, San Francisco architect, has formulated the professional program.

Unusual A/E News-IVA tour

A specially prepared, 17-day tour, exclusively for architects, to four countries: Brazil, Peru, Ecuador and Colombia is jointly announced by A/E NEWS and IVA—the Inter-American Visitors Association. The IVA program is to facilitate the exchange of professional groups between the Americas and to stimulate greater mutual understanding and better economic and cultural inter-American relations. The group, which will be limited to only 15 participants, will visit key cities, attend luncheons, banquets, receptions, seminars, and special events given by government officials, business leaders and architectural societies and social clubs. First class (regular carriers) air transportation (to and from NY), insurance, limousine transfers, gratuities, first class hotel accommodations (double occupancy) with Continental breakfast, ladies' receptions plus other features are in the program. Tour will receive wide press, radio and TV coverage. IVA's coordinating efforts makes cost of tour, per person, only $975, representing a 30% saving. Travel arrangements are by established and reputable agencies. Chairman of the group is Mr. David W. MacCurdy, of Voohees, Walker, Smith, Smith and Haines, New York architectural firm. Tour dates: from August 12 and return August 30, 1960. Inquiries should be addressed to: Inter-American Visitors Association, Inc., 30 Rockefeller Plaza, New York 20, N.Y.

(Continued on page 12)

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ECONOMY +

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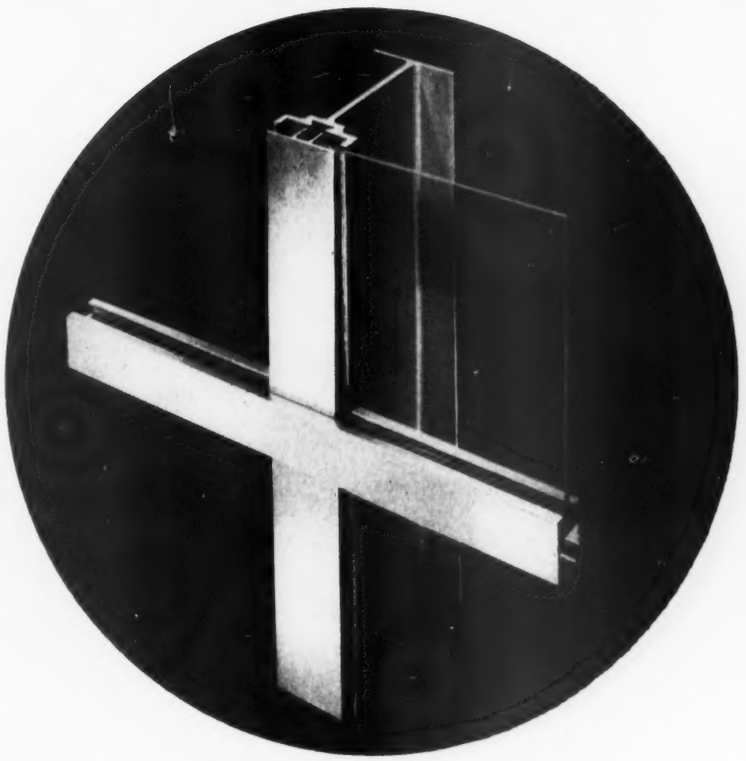

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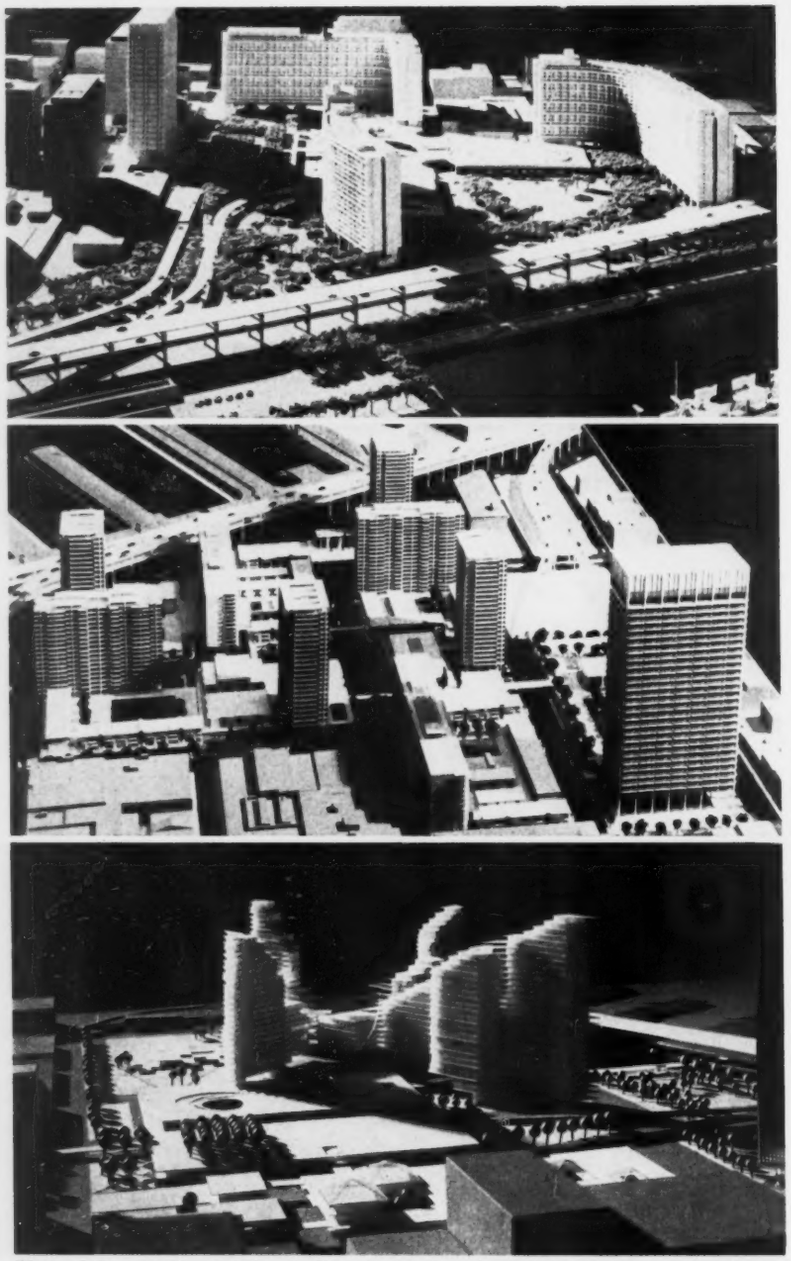
A|E NEWS

(Continued from page 11)



Three of the several proposals submitted for San Francisco's Golden Gateway Redevelopment Project (story column right) aimed at rehabilitating 20 acres of a sub-standard downtown area are shown in pictures above: (1) TOP PHOTO: Proposal by Edward D. Keil, Chairman of Board and Lewis E. Kitchen, President of the Golden Gateway Corporation provides for construction of three 22-story, long, gently curving apartment buildings with 2575 units, parking garages for over 3500 cars and 10 acres of residential parks with recreational facilities. A separate proposal calls for a monumental office building, containing 500,000 square feet, to be an integral unit in commercial area facing central mall. Hartford Life Insurance Company Group has given exclusive letter of intent stating preparedness to build office facility. Architects: Skidmore, Owings & Merrill, San Francisco, Calif. (2) CENTER PHOTO: Proposal by Kern County Land Co. and Del E. Webb Construction Co. Planned and designed by Welton Beckett and Associates, Architects and Engineers, development includes 2200 apartments located atop spacious elevated plazas with parking and service facilities underneath. Also included is a 30-story office building shown at right. (3) BOTTOM PHOTO: Proposal by Theo. G. Meyer and Sons and Sidney Leiken Enterprises, developers. Main structure is complex of 12 apartment buildings in one, with outside balconies and sun-deck patios, varying from 10 to 33 stories in height. Architects: Jan Lubicz-Nyca, ARIBA, John Collier, ARIBA, Philip Langley, ARIBA.

West coast report

The names of seven experts who will serve on the Architectural Advisory Panel created by the San Francisco Redevelopment Agency to help its members evaluate developer's proposals for the first structures to be built in the Golden Gateway Project were announced by Everett Griffin, Chairman of the agency's five-member commission. The appointments to the panel, Griffith said, reflect the agency's desire to have the benefit of advice from national authorities of recognized accomplishments and diversified viewpoints in a competition of national scale. In addition, he said, in selecting the advisors, the agency wished to avoid any conflict of interest between developers or their architects and the panel participants. The seven experts selected from the fields of architecture, city planning and mortgage banking are: Lawrence B. Anderson, AIA, Cambridge, Mass., head of the Department of Architecture, MIT; Henry S. Churchill, FAIA, Philadelphia, Pa., architect and city and community planner; Mario J. Ciampi, FAIA, San Francisco, Calif., architect; Louis I. Kahn, FAIA, Philadelphia, Pa., architect and redevelopment consultant; Morris Ketchum, Jr., FAIA, New York City architect and president of the Architectural League of New York; Fred Kramer, Chicago, Ill., mortgage banker and real estate developer and Minoru Yamasaki, AIA, Birmingham, Mich., architect. Ciampi will be chairman of the panel. The agency will receive developers' plans for apartment buildings (2200 units) and a garage (1300 parking units) topped by a tower for office or residential use to cover some twenty acres of the 44-acre project.

Completion of the new $1 million, air-conditioned state headquarters building for the 102,000-member California Teachers Assn. in Burlingame, Calif., has been announced by Dr. Arthur F. Corey, CTA executive secretary. Described by Corey as a "symbol of the importance of teachers in a free society", the new facility will serve as a state center for educators and affiliated organizations throughout California. Planned, designed, and engineered by *Welton Becket and Associates*, architects and engineers of Los Angeles, New York and San Francisco, the reinforced concrete three-story L-shaped structure contains a total gross area of 16,652 square feet.

CEC/NSPE/ASCE news

The fourth annual meeting of the executive committee and members of the board of directors of the *Consulting Engineers Council* will be held on May 2-7 at Gearhart, Ore., approximately 80 miles northwest of Portland. Representation from each of the 27 state associations affiliated with CEC is expected. Co-chairmen of the CEC meeting are Harry Czyzewski and D. L. McConnell, of Portland.

One of the major projects to be undertaken by the CEC—the publication of standard legal and procedural documents for the use of the consulting engineering profession—reached partial achievement this past month with the announcement that eleven, new, approved CEC forms are now available to members. To properly integrate the new forms into engineer specifications and drawings, the CEC Documents Committee has developed a recommended index for the guidance of engineering practitioners.

The *NSPE Functional Section for Consulting Engineers in Private Practice* reports that a recent Federal Post Office Department publication on construction requirements for leased postal facilities, prescribes the use of consulting engineers and architects. Where local, county or state laws, regulations or ordinances require the services of a registered engineer or architect to prepare plans and specifications, the regulation states, the bidder must comply. In any event, the Post Office adds, the bidder is "encouraged to procure the services of a competent architect or engineer in all instances." Regional offices of the Post Office Department will have final authority in applying the requirement. Complete bidders' instructions (POD Publication 39, September 1, 1959) may be obtained from the Government Printing Office, Washington 25, D.C.

There is a "crying need" for more real and genuine competition in bidding for the construction work on large engineering projects, especially public works, the *American Society of Civil Engineers* was told at a convention session held early last month. Citing the new Champlain Bridge at Montreal, Canada, now under construction, R. M. DuBois of New York City, stated that it is "truly amazing" to observe the range of prices submitted for one section of the project.

He said that such bidding methods are not conducive to real progressive development.

"The present practice of soliciting competitive bids on already detailed projects, which are often turned out by engineering mills as routine designs following decade-old detailing practices, does not promote progress."

He noted that the system does not leave a prospective bidder any room for exercising any ingenuity.

"Since the actual construction costs for a given project will prove to be the same for any well-run contracting firm, the only alternative a contractor has who really wants the job is to ascertain how hungry his competitors are."

Manhattan scene

Medals of Honor for achievements in the building arts in the past five years were awarded recently at the opening of *The Architectural League of New York's* National Gold Medal Exhibition in the American Craftsmen's Council's Museum of Contemporary Crafts, 29 West 53rd St., New York City.

In addition, a new League medal, the Collaborative Medal of Honor, was awarded to Mario J. Ciampi, FAIA, architect of San Francisco, his associate architect, Paul W. Reiter, and his collaborating structural and mechanical engineers, landscape architect, muralist, and sculptor in the design and construction of Westmoor High School, in Daly City, Calif.

The League's *Gold Medal of Honor for Architecture* was awarded to Ludwig Mies van der Rohe and Philip Johnson for the design of the Seagram Building, in New York City.

The *Gold Medal of Honor for Engineering* was awarded to Isadore Thompson, structural engineer, for the engineering of the Vista Mar Elementary School, in Daly City, Calif., designed by Mr. Ciampi.

The *Gold Medal of Honor for Sculpture* was awarded to Alexander Calder, for his mobile for the UNESCO headquarters building, in Paris—Marcel Breuer, Pier Luigi Nervi, Bernard Zehrfuss, architects and engineers.

The *Gold Medal of Honor for Landscape Architecture* was awarded jointly to Skidmore, Owings & Merrill, architects and landscape architects, and Isamu Noguchi, sculptor and landscape designer, for the landscape design of the Connecticut General Life Insurance Building, Hartford, Conn.

The *Gold Medal of Honor for Design and Craftsmanship* was awarded to Hervey Parke Clark and John F.

(Continued on page 14)

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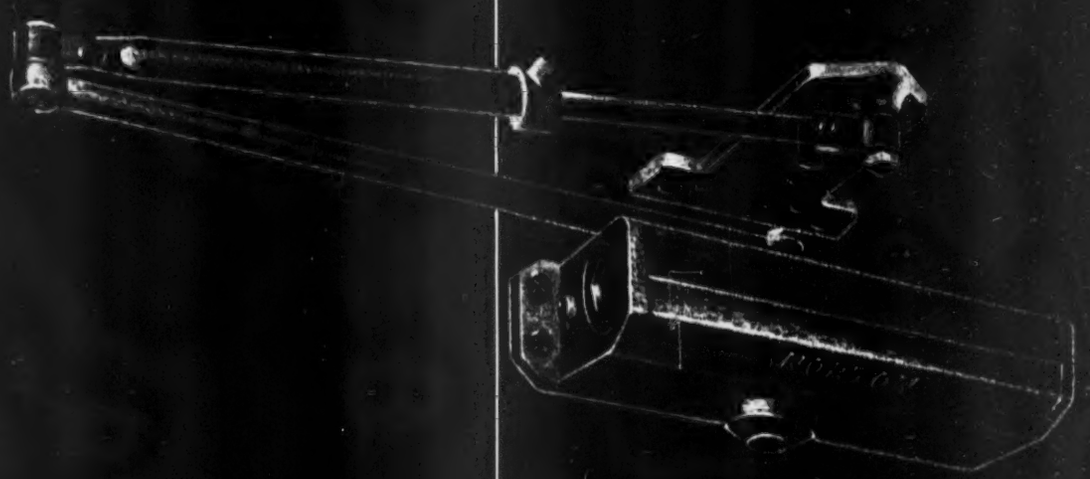

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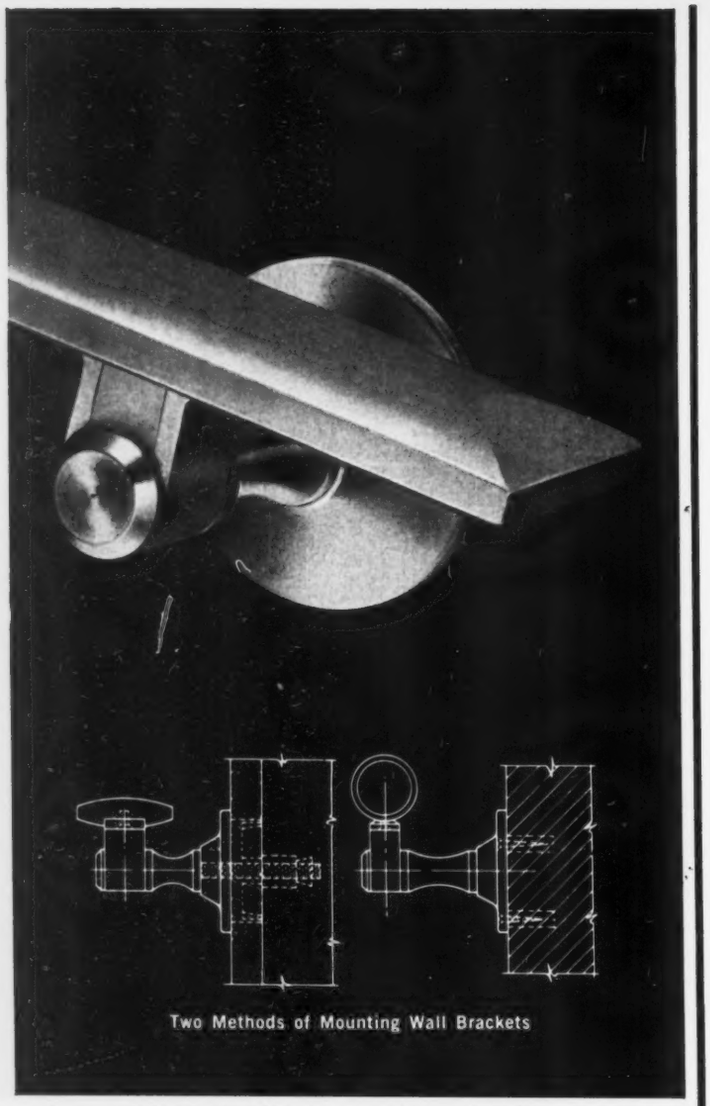

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A|E NEWS

(Continued from page 13)

Beuttler, architects, for the hand craftsmanship in building of the Christ Church, Episcopal, Portola Valley, Calif.

The National Gold Medal Exhibition, the League's first in two years, climaxes a series of six preliminary exhibitions held at the League this season in the following categories: business, industry and government; living; health and recreation; religion; education, and trade and transportation.

The juries selected the award-winning exhibits from among 206 invited and open submissions. The exhibit containing 62 projects—in the form of models and large-scale drawings and photographs—will be on display at the Museum of Contemporary Crafts through May 15. Following the New York showing, the exhibit will be circulated by the American Federation of Arts to galleries and museums tl.roughout the U.S. and Canada.

Architects and structural engineers in the New York Metropolitan area will have an opportunity this spring to learn about the practical application of the new theory of plastic design for steel structures via a lecture series to be given under the sponsorship of the *American Institute of Steel Construction* which commenced March 17th. The program is in cooperation with the New York Assn. of Consulting Engineers and the Metropolitan Section of the American Society of Civil Engineers. The lectures are also being given at leading major cities in other states. Further information may be had from John G. Hotchkiss, District Engineer, American Institute of Steel Construction, Inc., 101 Park Ave., NYC 17.

An appeal for public participation in open hearings on the New York City Planning Commission's zoning resolutions beginning in mid-March was made by Robert W. Dowling and Dr. Luther Gulick, joint chairmen of the *Committee for Modern Zoning*. The Committee is a temporary nonpartisan citizen's organization in support of modern zoning for New York City. Mr. Dowling is president of the City Investing Co. and Dr. Gulick, former City Administrator, is president of the Institute of Public Administration. The 100 members of the committee include many of New York's most prominent citizens representing official and civic groups, banking and finance, business and industry, architecture, communications and publishing, labor, education, women's organizations, real estate, etc. Messrs. Dowling and Gulick point out that the proposed resolution has been a "desirable and fresh approach" by the New York Chapter of The American Institute of Architects. It has also been hailed and endorsed by major housing, planning and civic groups.

The *Ford Foundation* announced that eight theater designer-architect teams were given grants to support projects for new theaters through the design and model phase, but short of completed working drawings. Working closely with directors, playwrights, technicians, and other theatrical artists, the designers and architects will develop their own ideal concepts of the stage. Late in 1961, the foundation expects to display the designs and models in exhibitions at several artistic and educational centers in the United States. The theater design teams are: Ralph Alswang, theater designer, Weston, Conn., and Paul Rudolph, AIA, architect, New Haven, Conn.—development of a theater using new film-projection techniques and live stage action simultaneously; Eldon Elder, theater designer, New York, and Edward Durell Stone, FAIA, architect, New York—design of a 2,000-seat outdoor theater; Barrie Greenbie, theater designer, New York, and Seth Hiller, AIA, architect, New York—design of an ideal theater for the modern dance; David Hays, theater designer, New York, and Peter Blake, AIA, architect, New York—design of a 299-seat open-stage theater; George C. Izenour, designer-engineer, New Haven, Conn., and Paul Schweikher, AIA, architect, Pittsburgh, Pa.,—development of a convertible theater complex and an experimental analogue and digital computer controlled space; Frederick J. Kiesler, AIA, architect and designer, New York—design of a flexible urban theater; Jo Mielziner, theater designer, New York and Edward L. Barnes, AIA, architect, New York—design of an ideal theater to house "intimate music-drama"; Ben Schlanger, AIA, architect, New York and Donald Oenslager, theater designer — efficiency study and design of a theater form-and-space concept.

ENVIRONMENTAL HYGIENE AND IT'S MEANING FOR AGRICULTURE

by Allen Pond*

The architect, in days to come, may well have to expand his professional horizon to include greater learnings in the physical, chemical and biological sciences. Mr. Pond explores the problems of undertaking a research program that would investigate the relationship of architecture, as a physical and social art, with that of the specialized world of environmental hygiene. This is one of the series of authoritative papers delivered before the AIA-NSF Conference on Research for Architecture which set forth the principle aim of the Institute with regard to research: "to provide practitioners and educators with more and better tools for the design and planning of finer buildings and communities in every sense of structure, function, aesthetics and economy." Reprint courtesy, national AIA Committee on Research for Architecture.

* *Assistant to Special Assistant for Health and Medical Affairs, U.S. Department of Health, Education and Welfare, Washington, D. C.*

Environmental hygiene, or sanitary science as it is more commonly known, deals with the control of diseases whose transmission or propagation is fostered by defects in the environment. The field is most closely identified with the medical sciences, and like them is intertwined with the physical, chemical and biological sciences. It is inescapably concerned, also, with various aspects of the social sciences. Practitioners in sanitary science have various backgrounds of training, but engineering tends to be predominant. In many respects, sanitary or public health engineers tend to be like architects and city planners. They must have considerable knowledge about a wide variety of things; and they must be able to relate many seemingly disparate kinds of knowledge in their efforts to manipulate the environment for protection and improvement of the public health and safety.

Fundamental mission of architecture

As I understand the fundamental mission of architecture, it is to bring into being the finest possible application of art-form to the problems of daily living, now and in the future. This seems to me to imply that the architect is basically an artist—one whose principle objective is to give form to ideas and to concepts that are not readily—if at all—made tangible by others in our society. If this be true, it follows that the architect is one who, like the practicing engineer or physician, deals primarily with the products of research and investigation.

The advancement of environmental hygiene has been largely dependent on progress in utilizing the products of a variety of research efforts. In some cases, empirical approaches to the solution of certain environmental problems have set the stage for disease control. For example, by the time the causative agents of typhoid fever, cholera, and the dysenteries were identified, it had long since been demonstrated that filtered water was far safer than raw water. But it usually has not been possible to pinpoint the attack on a disease until its causative organism has been positively identified. The only exception that I think of is in the control of smallpox by vaccination. Virtually all experience in sanitary science indicates that, until the precise cause of a disease is known it is almost impossible to deal with it successfully.

Major points

Assuming that one of the major objectives of architecture is to create an environment for man which is healthful and safe, the rate of progress in the art will be no faster than the rate at which empirical or scientific knowledge is accumulated and applied. While there has been significant progress in providing the tools for environmental control of many communicable diseases, society still lacks the precise knowledge that will be necessary to bring many of the psychological and physiological impairments of man under control. Thus, architects and city planners have a major stake in—though not necessarily a direct responsibility for—efforts to expand our knowledge about the relationship between environment and the health of man.

I will attempt in this discussion to: (1) bring out a few major points relating to the impact of environmental hygiene on the field of architecture; (2) outline some of the problems inherent in trying to blueprint *de novo* a broad research program; and (3) indicate the difficulties that will be encountered in attempting to launch a research program of any magnitude in a field as diffuse as is architecture.

Impact of sanitary science

Those of us who have spent our lives in the health professions and especially in sanitary science tend, I think, to overlook the clear relationship that exists between the control of water-borne disease and urbanization. Among the major forces that have made great cities possible has been the harnessing of water—pure, safe, potable water—without which no community can develop and survive. And yet, the full flowering of great metropolitan areas is more and more being threatened by absolute shortages of water.

Unquestionably, further advances will be made in the art of providing water supplies to metropolitan areas. Many of us here now will see the day when cheap energy will make it economically feasible to use sea water for domestic, industrial, and agricultural purposes. But domestic use of water produces sewage. As more water becomes available and is used, the problems associated with the disposal of liquid waste will grow and become more serious. We must never lose sight of this essential fact. Furthermore, the development of industry produces an ever-increasing demand for water, and the problems of industrial waste disposal become increasingly complex.

As a result of a great and growing need to find better solutions to waste disposal problems, there has been increasing professional interest in the development of adequate measures for the treatment of municipal and industrial sewage. Yet, there have been almost no significant advances in the art of urban sewage treatment in the past four decades. And we still have the septic tank with us! Furthermore, the amounts of money being spent in the United States in the search for improved methods to treat domestic sewage are less by far than the sums spent each year by a single large city for the disposal of its own sewage.

Concern with the disposal of industrial wastes—which in many instances reflects the public relations needs of business—is evidenced in the increasing attention to research on methods of industrial waste treatment. But the heavy investment in industrial technology and development is resulting in a myriad of new compounds used in manufacturing. Many of these produce wastes that are difficult to treat, thus adding to the pollution burden of our streams and to the waste treatment problems that must be solved through research.

As society tries to cope with the increasing quantities and complexity of municipal and industrial sewage, it is simultaneously being pressed by the burden of disposing effectively of other municipal wastes. There have been relatively few advances in the technics for efficient disposal of refuse. And as population concentrations grow, the sites for refuse disposal become more difficult to acquire and reach, the costs of collection and disposal go up, and the potential contribution to atmospheric pollution becomes even more significant.

One might assume that society long since would have concerned itself with the control of atmospheric pollution. To the contrary, it has only been within the past few years that any serious approach to problems of community air pollution has been made. We have little information on the health effects of air pollution. Indeed, there are few qualitative technics to use in measuring and identifying specific components in the atmosphere. Even for their partial

(*Continued on page 16*)

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identification, which is now possible, the procedures are tedious and expensive, and only a few laboratories in the country are equipped to carry out such procedures. Yet, with the history of significant episodes of serious community air pollution in this country and abroad, we cannot long delay this mounting of a substantial program of research, both epidemiological and chemical. Furthermore, there is just beginning to be an appreciation of the potential impact of radioactive substances of various types in the air we breathe and in the food we eat and drink.

Why do I stress these sanitary engineering problems at a conference on architectural research? Basically, because they are problems that will be of increasing concern to the architect and the city planner. Even though these are problems of great interest to the architectural profession, it seems clear that the profession is not equipped to make fundamental contributions to knowledge with respect to the health implications and control of the hazards associated with water supply or sewage disposal or refuse disposal or air pollution. Indeed, there is every reason to believe that the new knowledge that is needed is more likely to come from the physical, chemical and biological sciences than from either sanitary engineering or architecture. But the architect or city planner—like the sanitary engineer—can serve a useful catalytic function by constant stimulation and encouragement of those who are involved in the support and conduct of research and technical investigations in these fields. In fact, he must press for the solution of such problems if his own efforts to improve the living and working and recreational conditions of man are to be successful.

Careful consideration of the development of a new "research" program requires understanding of the basic difference between research and technology. Research involves a diligent search for new knowledge. Technology has as its target a definite end-product.

Problems of research program

One of the most difficult problems in charting any broad, long-range research program involves the basic fact that research in any field is an evolutionary process. One discovery leads to another, and it is impossible to predict where a given line of investigation will lead. For example, DDT is a product of research. It was first synthesized in the latter part of the nineteenth century, and originally was used for the control of potato bugs in Switzerland. It was not until the early days of World War II, when an all-out attempt was being made in the United States to find positive measures for control of malaria, that its lethal properties against mosquitoes and lice were first identified. Subsequent investigations indicated that DDT is also a potent weapon against other insects of health and economic significance. As time went on, however, it became evident that extensive use of DDT produced evolutionary processes in many insects, including mosquitoes. They became resistant to this chemical compound. Thus, an extensive new program of research on the insecticidal properties of closely related chemicals was undertaken, and new compounds were developed. Whether or not these will in turn produce insecticide-resistant insects is not presently known.

I cite this example to point out that while research often produces highly useful products (or building blocks), it may also create additional problems. There is never an end-point. Thus, any attempt to blueprint a research program may turn out to be a frustrating experience unless it is aimed at certain broad targets rather than specific end-points. Was it Pettenkofer who said: "The experiment that succeeds teaches nothing."

Those of us who are concerned with sanitary science recognize clearly that the kinds of research that we need in our field have little popular appeal, although there is growing public interest in air pollution research. Hence, in the competition for research dollars, the sanitary scientist is an "also ran" in comparison with his peers who work on dread diseases such as cancer, heart disease, diabetes, and the like. In the broad field of research support, it is clear that public interest in space and atomic energy research is infinitely greater than in environmental hygiene. This is not necessarily sheer debit, however. Indeed, in the long run, it may be a valuable asset. It seems abundantly clear that biomedical studies associated with exploration of space, or with research on fission and fusion processes, have the potential in the years ahead of contributing significantly to better understanding of the environment in which we live.

As we think of the problems with which the architect must cope, what are the potential contributions to architecture of biomedical studies related to the development of the atomic submarine? We now have actual experience in the crowding of scores of men for weeks on end far beneath the surface of the sea. Apart from the sanitary and physiological aspects of this new experience, what psychological lessons have we learned, and how may they be useful in the development of building standards? Does this experience have any significance, for example, with respect to the need for windows in schools or office buildings or even in dwellings? (In contemplating the possible values of windowless structures, we should not overlook the need for fire exits!)

It is currently estimated that it will cost $200 million to put the first American into space. I have no idea what portion of that budget will be spent for biomedical research. However, it seems certain that some of the findings in some way will be useful to the earthbound architects. The physiological and psychological problems that must be solved for the spacemen may give us leads for use in meeting problems in our earthly environment. Similarly, how may research at Oak Ridge or Brookhaven or Hanford be useful in finding ways to improve the design of ventilation systems, or the control of community air pollution, or the disposal of liquid wastes?

The point I am trying to make is that there are already in being tremendous research activities sponsored by government and private enterprise in our efforts to harness the atom and to conquer space. Many aspects of this research may be useful in the search for knowledge that will be useful to the architect. The question arises: Is it reasonable to expect the architectural profession without substantial additional scientific training to add significantly to the work of the scientific community in searching for new knowledge, some of which can be applied to improve environmental hygiene; or are architects more likely to make a useful contribution by finding ways of applying new knowledge as it comes available?

Difficulties in architectural research

One of the major problems the architect has as he approaches the development of a posture for his profession with respect to research is that for the foreseeable future, public officials and scientists will together play a leading role in the planning and organization of this nation's major research efforts. I am convinced that we are approaching the threshold of public interest in the social sciences, which are also of concern to the architect. But as I have watched the development of research in the medical sciences, I am more and more aware of the part that public demand plays in developing adequate support for scientific inquiry.

It seems to me that the architectural profession, in its proper concern for research, must rely to a very heavy extent on the leadership in various professions and scientific disciplines to cooperate in a common search for knowledge. If, as is frequently said, the architect is a coordinator and user of knowledge from a vast panorama, he must prepare himself to work closely with the scientific investigator. However, without very extensive training in the sciences, he is not likely to be a prime producer of knowledge.

I suppose the architect, possibly more than anyone else, recognizes that one of the important gaps in our social structure involves the lack of efficient machinery for the winnowing of new knowledge for utilitarian purposes. It seems to me to be an open question as to how best the architectural profession can balance its efforts with respect to laboratory research. How far should it go in trying to launch its own fundamental research program, particularly in the face of the present intensive national efforts in allied fields? Or is the temper of the times such that architecture would be better served if it were to use its resources in stimulating and supporting efforts to speed the efficient utilization of new findings from research conducted under other auspices?

Utilization of knowledge

How can the architect and planner take advantage of knowledge developed from scientific research? There seem to be two possible approaches, although they are not mutually exclusive. On the one hand, if he is to enter actively into scientific research, the architect—like the engineer and the physician—will require very intensive and long-term training in one or more branches of basic science.

The other approach to solution of the problem would involve the organization of machinery which will insure bringing broadminded and understanding members of the scientific fraternity into close and regular contact with the architectural profession. I have no suggestions as to how this can be done, but I would call to your attention the success of the American Public Health Association Committee on the Hygiene of Housing in utilizing first-rate scientists and broadly experienced administrators in a common effort.

As I pointed out in the beginning, architects and planners are very much like sanitary engineers. They must have considerable knowledge about a wide variety of things. I would emphasize, however, that the sanitary engineer has to rely for advancements in knowledge on the efforts of individuals far more skilled than he in a broad spectrum of scientific disciplines. Perhaps this is the best lesson that architecture can take from the field of environmental hygiene.

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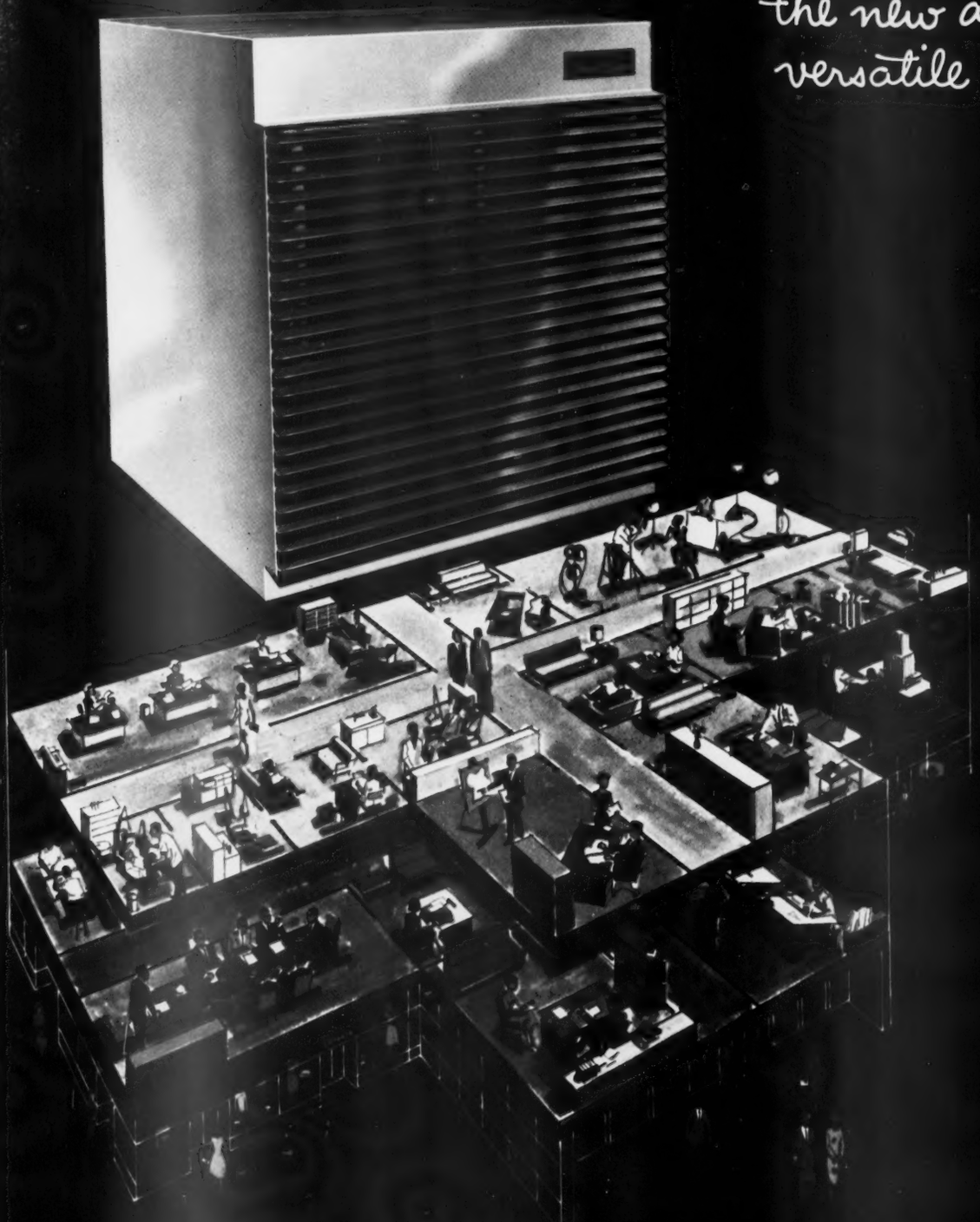

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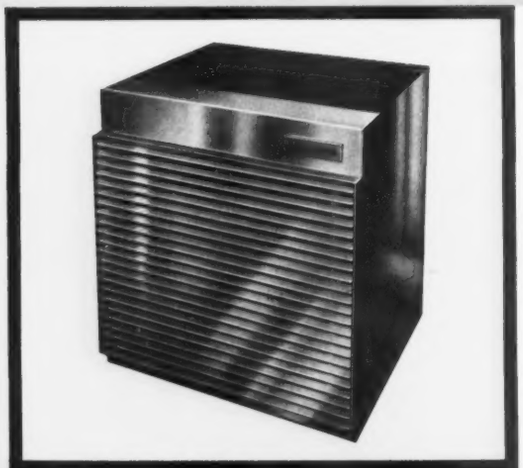

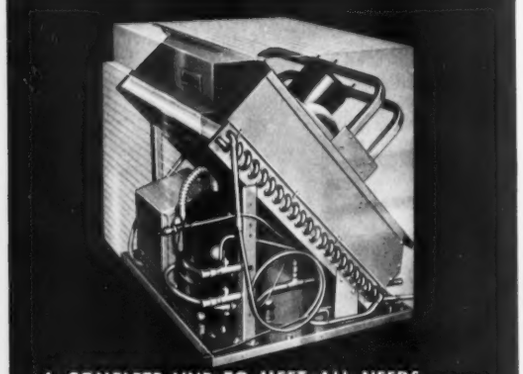

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METHODS OF REDUCING THE COST OF PUBLIC HOUSING

Tower Scheme

A/E NEWS presents a synopsis of an authoritative research study conducted by the School of Architecture at Pratt Institute, Brooklyn, N. Y., under the sponsorship of the New York State Division of Housing. Publication, in book form, was made possible through a special grant from the Dow Chemical Co. of Midland, Michigan. The research is a comparative analysis of various cost-saving ideas for public housing construction and it presents recommendations for immediate adoption and for future consideration. The graduate student project, under the direction of Professor John H. Callendar, AIA, and with the assistance of faculty member, Giles Aureli, investigated five major areas: planning and building layout, structure, exterior envelope, interior partitions, and mechanical equipment. In his preface, Dean Olindo Grossi underscores the value of the project in that "this is a never ending study, because new materials and methods continue to influence costs." Here we find one more significant step in expanding the architect's knowledge and ability in providing a more imaginative and economical environment—both physically and psychologically—in large-scale housing.

Of the several plan types which were explored by the Pratt Institute research team for possible economies, three were selected for detailed study:

1. *tower scheme*
2. *open-corridor scheme*
3. *interior-corridor scheme*

None of these plan types can be considered new or radical. All have been used for low or middle-income housing for at least a decade. However, the first two have been rarely used in New York City public housing, while the third is now common, having largely replaced the cross plan which dominated public housing for almost two decades. The third scheme is included here largely as a basis for comparison with the two less familiar schemes.

In each of three plan types the following departures from current New York City public housing practice have been incorporated:

1. *regular column spacing*
2. *full distribution of apartment sizes in one building.*
3. *no basement*

Regular column spacing is, of course, more economical than irregular spacing and is used as a matter of course for most buildings. However, architects have found it difficult to conform to the rigid planning requirements imposed by the housing agencies without departing from regular column spacing. Flat plate reinforced concrete construction with "spattered" columns solves this problem by permitting the columns to be located in accordance with plan requirements. This type of construction, although more expensive than regular column spacing, is now standard practice in New York City housing work.

In order to re-examine this situation, the three plan types selected for study were all designed with regular column spacing. Required room sizes have been maintained in all cases and the columns, projecting only a few inches, do not seriously impair the use of the living space. On the basis of these examples, it would appear that the economies of regular column spacing could be achieved without sacrifice of livability, if the housing agencies would modify their requirements slightly, and if the architects would employ more ingenuity in planning.

The required distribution of apartment sizes in a housing project has traditionally been achieved by the use of different buildings for the different apartment types. This technique is practical in the large multi-building project which has heretofore been the norm. Recent changes in public housing policy favor more small projects—even one-building projects. Each of the three schemes presented here has been designed to provide the full range of apartment sizes in a single building, in order to demonstrate that this idea is not only possible but entirely practical.

Basement space often costs more than the equivalent space provided above ground. Where ground conditions are poor, a situation frequently encountered in housing projects, economies can be achieved by omitting basements, and providing equivalent space on the first floor. Since the space ordinarily provided in the basement occupies only a fraction of the total floor area of the building, the remainder of the ground floor can be left open to provide covered play spaces and sitting areas. The improved visibility at the ground level which results from this scheme would go far toward mitigating the "walled-in" feeling produced by the long high buildings of the interior-corridor type.

Several other ideas have been tried in one or more of the three schemes presented here. A system of framing employing cantilever floor slabs with two columns per bay, instead of the usual four, has been used on both the open-corridor and the interior-corridor schemes. The possibility of providing a combined utility and play area midway in the height of the building, has been suggested for the tower scheme. The cost-saving skip-stop elevator system has been employed in the open-corridor scheme. The possibility of using the living room for sleeping, thereby eliminating one bedroom in each apartment, has been explored in the interior-corridor scheme, as has also the use of a "dormitory" bedroom for three or four children.

1. TOWER SCHEME

This is the name given to a plan type which is approximately square, with the rooms disposed around all four sides of a central service core. It has been used successfully for middle-income housing in New York and Chicago since the late 1940's. As far as could be ascertained, the tower scheme has not yet been used for low-income housing, probably for the reasons discussed below.

Advantages vs. disadvantages

The tower scheme has a number of advantages and one serious disadvantage. It is readily apparent that the compact plan results in a minimum of perimeter construction and the shortest possible utility runs, with attendant economies. Even more significant is the reduction in the amount of expensive public corridor space; in the tower scheme the area of public corridor per construction room is about half that in the interior-corridor scheme, and public corridor space is relatively expensive.

A serious economic handicap to the tower scheme is the high cost of elevators. Providing only four to six apartments per floor, as compared to ten to twelve apartments per floor in the interior-corridor scheme, the cost of elevators per dwelling unit is thus two to two and one-half times higher in the tower scheme. For this higher cost, greatly improved livability is provided. This scheme is presented here in the belief that the economies noted in the para-

(*Continued on page 20*)

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graphs above will offset the higher cost of the service core, thus affording improved livability at no increase in cost.

2. OPEN-CORRIDOR SCHEME

In this type of building all of the apartments are reached by means of outdoor corridors or "elevated sidewalks," as they are sometimes called. The characteristic shape of such a building is long and thin. The open-corridor scheme has been used for low and middle-income housing in many places, both in this country and abroad.

Outstanding advantage

Improved livability is the outstanding advantage of the scheme. Every apartment has through-ventilation and two exposures, and every apartment can have the most favorable orientation. All rooms, including bathrooms, have outside light and ventilation. The interior corridor, which in practice is often an unpleasant space—narrow, dark and smelly—is eliminated easily. These gains are partially offset by some loss of privacy for the rooms that open on the corridor.

The open-corridor scheme eliminates the cost of mechanical ventilation for the bathrooms and the cost of the interior corridor with its expensive finishes. But the open-corridor, being "single-loaded", must be at least one and one-half times as long as the interior corridor. Since codes (NYC) limit the maximum distance from an apartment to a stair, the open-corridor building must either be content with few apartments per floor or it must separate the two required stairs. The open-corridor, of course, need not be heated but some provision must be made for snow removal; in New York the Building Department requires the installation of electric heating cables in the floors of all open corridors. Since all apartment doors open to the outside, these doors must be of the exterior type and must be weather-stripped. The long, thin building shape with its high proportion of perimeter to enclosed area, is not basically economical, nor, in a high rise building, is it basically stable; extra cost for wind-bracing must be assumed.

Site planning and ventilation

In most cases, the tower plan provides cross-ventilation and two exposures for each apartment, a very desirable arrangement as far as livability is concerned. The tower scheme also offers advantages in site-planning. The square plan is very easy to dispose, even on an irregular site, and when used in large projects, it results in a greater feeling of openness on the site than occurs when long narrow buildings are used.

Economies in skip-stop scheme

In view of all the items noted, it might be concluded that the economic position of the open-corridor scheme is unfavorable. But this is not the case. Recent cost studies for a newly designed public housing project in New York indicate very substantial cost savings resulting from the use of the open-corridor scheme.

In the illustrations, the open-corridor scheme has been combined with skip-stop elevators. In this arrangement, the elevators stop only at every third floor; tenants on the intermediate floors have to walk up or down one floor. The open corridor occurs only at elevator-stop floors. All apartments open off the corridor; stairs are within the apartments and are maintained by the tenant. This scheme has been used in a noted upper-income project in Cambridge, Mass., and in a proposed low-income project in New York.

The skip-stop scheme saves the cost of two out of three corridors and elevator doors and controls. Against this saving must be balanced the cost of the private stairs and the fire escape balconies in two out of three of the apartments. A significant advantage of this scheme is the elimination of most of the privacy problem. By placing the larger apartments on the intermediate floors, it was possible to arrange the plan so that no bedroom opens on a corridor.

Structural system

The structural system employs regularly spaced reinforced concrete columns, two per bay, with the floor slabs cantilivered 4 feet beyond the columns on each side. Stair and elevator towers have been placed outside the building proper, and designed to supply windbracing for the tall, narrow building.

3. INTERIOR-CORRIDOR SCHEME

The interior-corridor scheme is now in common use for low and middle-income housing. It is a simple and economical scheme, permitting ten to twelve apartments per floor. It does not, however, provide cross-ventilation except for the four corner apartments. In New York City public housing, the requirements of cross-ventilation for all apartments having more than one bedroom have produced a variation of this scheme in which the service core forms a "pinched waist" thereby permitting the four adjacent apartments to meet the technical requirements for cross-ventilation. It is believed that if cross-ventilation is to be considered a primary value, then the open-corridor or the tower scheme should be used rather than the interior-corridor scheme.

The interior-corridor scheme given in the Pratt Institute study is shown with no basement, with regular column spacing, and with the full distribution of apartment types in a single building. In common with the open-corridor scheme, it employs a two-column bay with cantilevered floor slabs. Since there is no basement, the facilities usually found there are located above ground. The remainder of the ground floor has been left open to provide useful covered space and pleasant vistas through the building. One significant advantage of this scheme as presented in the study is the recommendation that the living room might be also used for sleeping. If it is considered desirable to do this, the cost savings would be very appreciable, since one bedroom would be eliminated from each apartment.

STRUCTURAL SYSTEMS

Of the many possible ways of framing a building, five methods which appeared to offer the greatest promise of effecting economies, immediately or in the near future were selected for study by the Pratt Institute researchers. The possibilities range from the old and very familiar to the new and less familiar. None can be called experimental; all have been extensively and successfully used, either in this country or abroad.

The system of construction now used almost universally in New York City for public housing is reinforced concrete flat plate with "spattered" columns. As discussed, previously, the spattered column arrangement has resulted largely from the rigid planning requirements imposed by the government housing agencies. If these requirements were to be relaxed, the economies which are inherent in regular column spacing, regardless of the material or method of construction used, could be realized in public housing. Thus all of the structural studies presented here assume regular spacing of the structural elements.

The study begins with a consideration of two variations of the presently used flat plate reinforced concrete systems. Then attention is directed to a precast concrete system and to modern light framing. Finally a new look is taken at an old stand-by—non-fireproof masonry bearing wall construction.

1. TWO COLUMN CANTILEVER SYSTEM

A reinforced concrete flat plate construction having only two longitudinal rows of columns instead of the usual four. Floor slabs cantilever out beyond each row of columns and support the walls, which should obviously be as light as possible since the elimination of many columns and the reduction of foundation loads seemed likely to result in over-all economy.

Structurally, the double-cantilever design is highly efficient because bending moments at columns and at midspan are nearly equal, resulting in less reinforcing steel and less concrete per slab.

Comparative analysis

A comparative analysis of the two-column cantilever vs. the four column cage is presented in the study in order to investigate the possible use of the two-column system in public housing.

The two column cantilever system was successfully used in the Statler-Hilton Hotel in Dallas, Texas, with an appreciable cost saving over the conventional framing method. Here the slab was cantilevered ten feet beyond the column centerlines to support the lightweight exterior curtain wall. The use of a lightweight concrete aggregate, which was readily available, further helped to reduce the dead weight of the structure and made possible the use of this structural system to its greater efficiency. A comparative analysis of the two systems demonstrates that in New York City, the four-column system would cost $.30 per square foot or 12 per cent less than the two-column cantilever type. However, should lightweight aggregate be competitively available in New York City, it would lower the cost of this system to somewhere near that of the cost of the conventional type by reducing the dead weight of the structure itself, thereby reducing the amount of reinforcing steel required. The use of an extremely lightweight exterior wall would also reduce the concentrated load on the ends of the cantilevered floor slabs and subsequently the cost of the two-column system would be substantially reduced.

The comparative ease of forming the identical 10 inch x 48 inch columns and the reduction in the total number of columns and foundation further suggest a substantial saving in construction time with an accompanying cost saving.

2. LIFT-SLAB CONSTRUCTION

Reinforced concrete flat plate floor slabs poured on the ground, one on top of another, and lifted into place by the patented "lift-slab" technique. Columns are assumed to be steel, but may be precast concrete. This relatively new system of construction has proven to be more economical than poured-in-place

construction for many types of buildings in all areas of the country. There are advantages for public housing programs with the system's proven economies.

The lift-slab system has in recent years become an accepted method of erecting a structure in the safest and most economical way. Lift-slab as a proprietary system of construction relies on underbidding poured-in-place concrete construction for its existence. The effort to combat continually rising costs of both labor and material should direct itself towards:

1. *A search for a lighter structure which would mean smaller foundations—fewer piles—fewer foundation problems where there are too many already.*
2. *A striving for greater mechanization where every effort should be made to take full advantage of machine techniques to supplement hand labor.*

3. BOX-FRAME CONSTRUCTION

A frameless construction of precast concrete slabs, applied both horizontally and vertically. Wall, partition, and floor slabs are cast on the ground and lifted into place by crane. Little used as yet in this country, this system has been used extensively in Europe. By eliminating all columns and beams, and most of the formwork and scaffolding, it seems likely to effect notable economies.

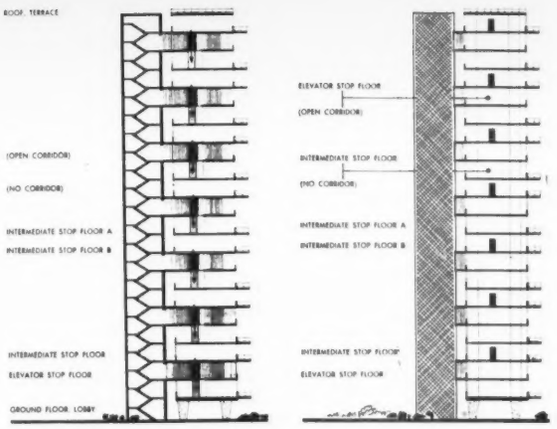
Advantages

The advantages of the box-frame are many. One is the ability of the system to resist any wind forces acting upon it. Horizontal displacement of one story with respect to another is prevented in a skeleton frame by shear across the columns. In the box-frame, it is prevented by friction of wall on floor making movement negligible because of the sheer weight of the wall. In effect, each wall acts as a solid plate, stiffened by the floor system. Because of this integral system of wind bracing; the over-all sway of the structure is greatly reduced, if not entirely eliminated. The economies involved here become most significant. Long range savings occur in maintenance. Such common repair problems as cracked partitions, sprung doors, damaged window frames and the like, resulting directly from the movement of the structure, are eliminated. The structural elements in themselves are fireproof resulting in a completely fireproof structure thereby eliminating the need for further fireproofing. Foundation problems, where soil does not have much bearing capacity, are greatly improved because the total load of the building is distributed over a much larger area. In the system there is also the added advantage that the bearing walls between the apartments give excellent sound insulation (60 decibel reduction for a nine-inch wall).

The first example of box-frame construction in the United States is the Hartford Park public housing development in Providence, R. I. Though this system was cast in place, the structural principles are the same. The savings realized on this project have already been published and clearly show the marked economies of this system.

Economies

With development of pre-casting techniques, the economies and other advantages of the box-frame became obvious. The virtual elimination of formwork is one of the first cost savings involved. Mass production of the structural components, the pre-casting of standard size units, either factory-cast or cast-at-the-site, is another cost saving feature. The ease of erection of the pre-cast units greatly reduces construction time and thus reduces the cost of the structure. Whole sections of exterior walls (adequately insulated) as well as partitions and floors, can be erected and placed in record time. The savings indicate that this system should be investigated further as a possible building method in the near future.



OPEN CORRIDOR SCHEME—left shows cross-section through the elevator tower. Right shows cross-section through the open-corridor. This skip-stop scheme saves cost of two out of three corridors and elevator doors and controls.

Perspective study showing a housing project utilizing an interior-corridor scheme. Economies are possible utilizing two-column cantilever system. Simple scheme is now in com-con use for low and middle-income housing.

In box-frame building shown here, entire structure is exposed and the main architectural expression of unit is revealed through cellular, honeycombed character. Articulation of structure in this way gives more interest than monolithic, sheer wall masses now prevalent in much public housing.

Theory

This system of construction is based on the theory that vertical members, which outnumber and are larger in total area than horizontal elements, might logically be precast with considerable economy. By making these vertical members load-bearing, the need for a structural frame could be completely eliminated. Certain of the interior partitions (corridor walls, party walls and the like) would structurally support each floor. In like manner, each floor could be precast in sections and erected and joined to its carrying walls.

Structure

Structurally the system is very simple. In the standard skeleton frame construction, all loads are transferred from floor slab to beams to girders to columns and hence down to the foundation. The loads are concentrated at each column. In the box-frame walls and partitions carry the load of the floor slabs without the use of columns or beams. Vertical panels are lifted into place by a crane, set on a bed of mortar and held in position with braces. Steel lifting eyes in the top edges of the panels provide anchorage when the floor or roof slab is lowered into position. The weight of this total structure is reduced by the use of lightweight concrete.

4. LIGHT-STEEL FRAMING

The use of bar-joists, junior beams, and cold-rolled sections has proven to be more economical than reinforced concrete construction in many cities. The selection made by the research team for investigation is that of the light-steel framed 40-story Levitt project in Queens, Long Island. This system demonstrates a saving under New York conditions. The reduced weight of the structure indicates the possibility of significant savings in foundation costs, especially where piles are necessary.

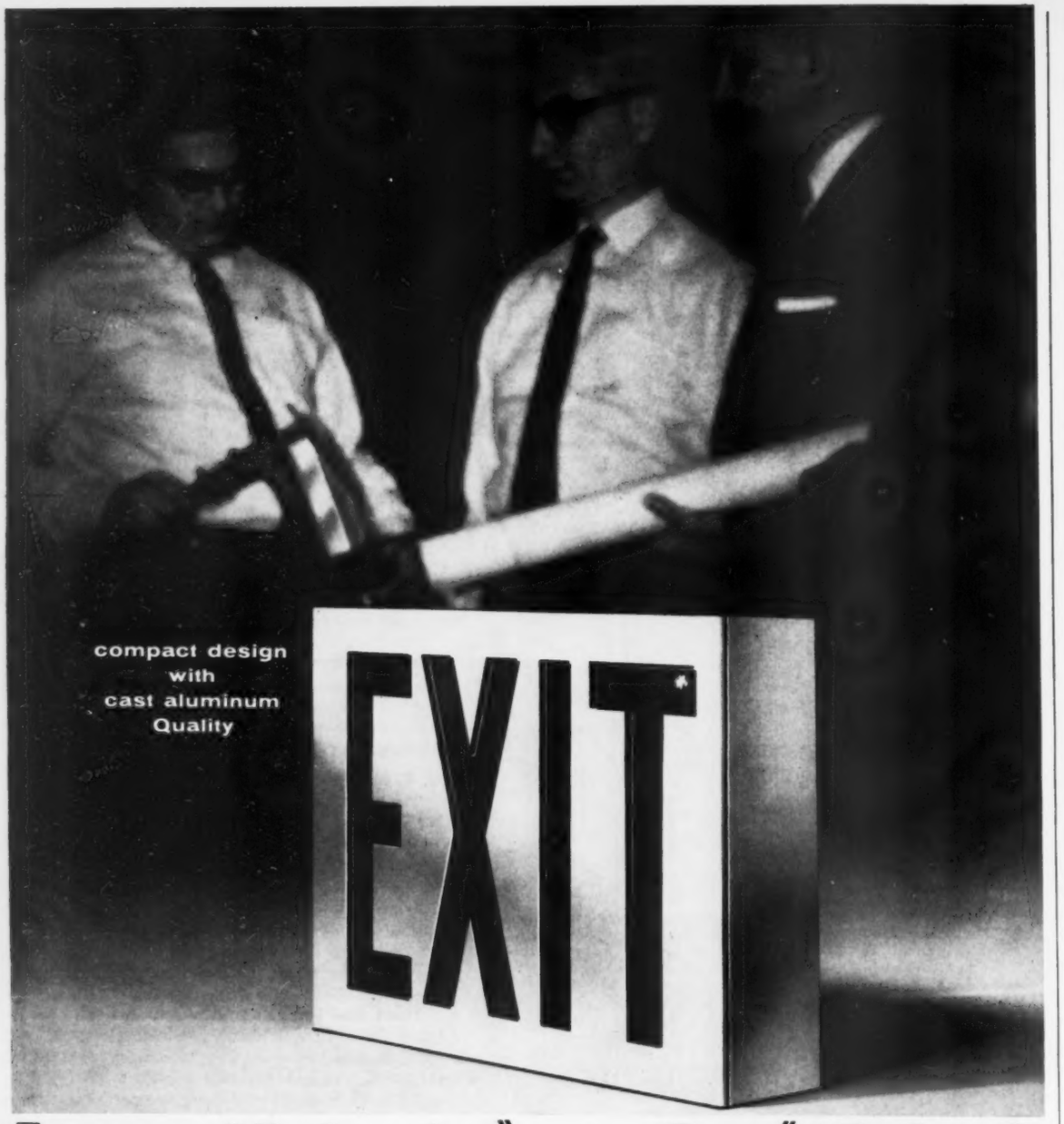
There has been a considerable amount of controversial discussion about the potential use of light-steel framing in multi-story apartment house construction. The research staff decided to analyze this method. They found it difficult to corroborate their findings with factual data due to the wide range of conflicting professional opinion on the subject.

Considerations

One basic consideration is that of using a regular column spacing. This has been estimated to save from 5 to 10 per cent of the structural cost. Therefore, it is an actual cost saving and not just a restrictive requirement. Another point that cannot be stressed too heavily is that the architect should be given some freedom in planning of apartment layouts so that the regular spacing, so necessary with steel construction, will not become a planning handicap. Some relaxation of the stringent room size requirements should result in an over-all lower building cost.

Regular column spacing is not a unique requirement restricted just to light-steel framing. All struc-

(*Continued on page 22*)



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(*Continued from page 21*)

tural systems are more economical if regular column spacing is used. Lift-slab in particular, depends upon regular column spacing for economies. The 5 to 10 per cent cost saving is due to the duplication of all steel members throughout the structure. Since most parts are interchangeable, fabrication of all units is simplified. Maximum usage of the theoretical moment which produces deflection in beams is obtained for the steel. Because of this maximum use of moments, there is no waste in the amount of steel required as there is in structural systems which contain unequal bay systems with scattered column spacing. Thus, the savings are also obtained in weight of steel required.

The use of light-steel framing is not a radical step in economical multi-story apartment house design. For many years it has been utilized to provide a rigid, fire resistant, economical floor construction for multi-story office buildings, schools and apartment houses. Some advantages of light-steel framing are as follows:

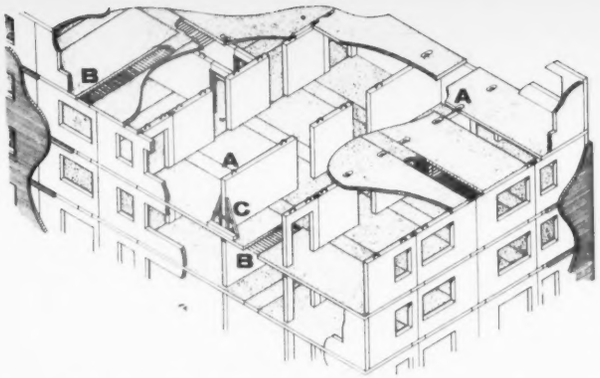
1. *It is a fire-resistant construction.*
2. *Light in weight, thereby decreasing foundation loads as well as facilitating the handling and placing of members.*
3. *Goes up faster, and uses less field labor (particularly in forming) than most other structural systems.*
4. *Contractors take minimum risk in this kind of work, because almost all elements are prefabricated, not field manufactured.*
5. *Because of the open-web construction, space is available for the passage of pipes and electrical conduit. This will result in lower costs for the electrical and mechanical trades. It will also enable the running of unsightly steam risers and returns under floor to a central point.*
6. *Material is non-rotting and termite proof.*
7. *Standardized in dimensions and in carrying capacity.*

5. NON-FIREPROOF CONSTRUCTION

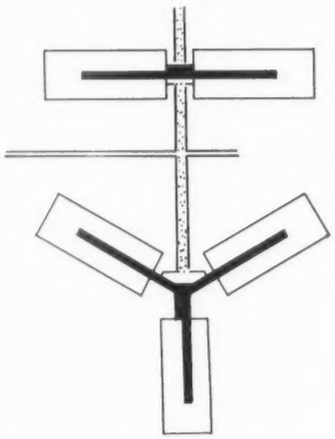
Wood or bar joist floor construction on masonry bearing walls. This type of construction is very widely used in New York City for middle-income housing, and the question is naturally raised as to why it should not be considered suitable for tax-supported low-income housing. Limited by law to a maximum height of six stories (in New York City) this type of construction might well be used in outlying areas where land values do not necessitate high rise buildings, and also in central areas in conjunction with high rise buildings.

Flexibility and some misconceptions

This type of construction is flexible enough to find application in almost any over-all shape desired, (the report illustrates "dumb-bell" and "Y" shapes), similar to those currently being built by the New York State Division of Housing. A common misconception about non-fireproof buildings is that they are totally lacking in fire protection. This is not so, although the interior partitions and floor construction are not legally required to have any fire rating, by the very nature of their construction. Nevertheless, they attain very nearly a one-hour separation. In addition, the required three-hour rating at the first tier, effectively isolates the cellar, which ex-



Isometric cut-away view of current New York City housing project utilizing box-frame construction. View shows precast load-bearing walls and precast floor slabs in their relative positions. For clarity, all other partitions have been omitted. Shown are specific jointing techniques used between various type slabs and position of these joints. "A" indicates lifting rings later grouted to anchor wall panels to floor panels. "B" indicates poured filler strip (bars exposed in precast floor slab to permit strong bond). "C" indicates temporary shoring for free-standing wall slabs.



Diagrammatic layout showing flexibility of non-fireproof construction in application in almost any overall shape desired. Sketch shows arrangement of "dumbell" or "Y-shaped" buildings with dark lines which show corridor runs.

Study for non-fireproof buildings showing possibilities for attractive buildings within restrictions of the economies of this type of construction.

perience has shown to be the major source of fires in multiple dwellings. Increased maintenance costs, commonly attributed to non-fireproof buildings, is another misconception. In actuality, the finished surfaces are or can be of the same materials currently used by the Division of Housing, namely, plaster partitions, asphalt tile floors, brick walls. The only increase in maintenance costs required would be periodic painting of fire escapes.

Advantages and disadvantages

The Pratt Institute research team states that the New York State Division of Housing could certainly initiate the adoption of non-fireproof construction in areas where land values permit the use of medium-rise buildings. In projects where high-rise dwellings are felt to be necessary, the introduction of some non-fireproof medium-rise buildings should be considered, not only from the point of view of cost savings, but because they introduce a more human scale into an otherwise titanic building grouping. They also create an area of transition between the high-rise buildings, and the surrounding neighborhood which usually consists of 4 and 5-story tenements.

A minor disadvantage to the use of non-fireproof construction is the necessity of placing fire escapes on the exteriors. As a rule, they are adverse visual elements, deterrents to privacy and a temptation to burglars. Another drawback is the problem of vermin, since both floor and partition construction are hollow. Another disadvantage is cost of insurance: 15 cents per $100 as contrasted with 5 cents per $100 in fireproof construction.

These drawbacks can be alleviated somewhat by a more aesthetic handling of the escapes with new materials and the incorporation of color into the design. Protection against intruders can be provided by a judicious placing of fire-escape balconies at windows which can be locked and curtained for privacy. Pest control can not be "built-in" into this system. The increased cost of insurance would have to be carefully considered especially if the amortization of the building is over a fifty-year period.

RECOMMENDATIONS

The Pratt Institute research report presents a comprehensive series of recommendations which are based on an immediate and a future category. The recommendations, for both immediate and future action, cover the wide range of planning studies, structure, exterior walls, interior walls, partitions, finishes, mechanical installations and systems. Some of the areas which have not been covered thus far in this article are:

Exterior-immediate possibilities

Insulate the present wall construction with a combination of insulating and back-up materials to arrive at a wall which costs less to install and will save a substantial proportion of the heating cost throughout the life of the building. For example, a cavity wall consisting of 4-inch brick exterior and 3-inch Insulrock (proprietary material) interior plastered directly, and with the cavity filled with expanded polystyrene rigid foam insulation costs 2 cents per square foot less than the present exterior wall in place ($2.61 vs. $2.63) and represents a saving of 17 cents per square foot of net exterior wall in reduced cost of the heating installation due to reduced heat losses ($.13 vs. $.30); the net cost of the insulated wall is thus 19 cents per square foot less than that of the present wall ($2.74 vs. $2.93) and it will save 88 cents per square foot of net exterior wall in fuel costs over the fifty-year life assumed for the building ($.72 vs. $1.60). This recommendation covers the insulating of the net (solid) wall which constitutes approximately 75% of the gross exterior wall on most public housing projects.

Exterior—future developments in housing

Use of precast concrete sandwich panels. They have been used in many buildings over the past decade. This construction would meet a two-hour fire rating (in N.Y.C.). This type of panel with a broomed exterior finish resembling limestone and a smooth trowelled interior which requires only painting, can be erected for the same cost as the present wall (including cost of heating installation per square foot of net exterior wall in place), but it saves 61 per cent of the wall thickness and will save 70 cents per square foot of net wall area in heating cost over a fifty-year period. Development of a low-cost insulated metal curtain wall panel, meeting the fire resistant requirements and adaptation and economical for public housing requirements.

Interior—immediate possibilities

For apartment partitions use plaster on gypsum lath (2″ thick) or three-ply-laminated gypsum board (1½″ thick) with taped joints. Other possibilities are exposed concrete block (3″) or four-play laminated gypsum board (2″). Estimated savings, 10-25 per cent of present cost of partitions.

For partitions between apartments use 6″ exposed concrete block or four-ply laminated gypsum board. Estimated savings, 10-20 per cent of present cost.

For partitions between apartments and public corridors and between stairs and elevators and public corridors, use exposed concrete block, cement-faced concrete block, or concrete block with sprayed-on enamel finish. Estimated savings, 40-60 per cent of present cost.

Mechanical costs-immediate savings

Use above-floor bath tub and toilet. Higher cost of these fixtures is offset by savings resulting from not having to cut through the floor construction and by the improved appearance and privacy resulting from no soil pipes exposed on bathroom ceilings. Estimated saving, $25.00 per bathroom.

Use 4′-6″ bath tub instead of 5′-0″. This permits reducing the width of the bathroom by 6″ with no reduction in livability. Estimated saving $35.00 per bathroom.

Use one-pipe mono-flow hot water heating system instead of the two-pipe vacuum steam system now used. Estimated saving, 16 per cent of present heating system cost.

Mechanical savings in future innovations

Use copper tubing with soldered joints for both supplies and waste and vent piping. This is now prohibited by the (NY) city code, although permitted by the New York state code. Estimated saving, 10 per cent of roughing cost.

Use loop-venting instead of individual fixture venting. This is now prohibited by the city code, although permitted by the state code (NY). Estimated saving, $22.00 per bathroom.

Use prefabricated plumbing roughing. This is a question of obtaining approval of the local plumbers union. It has been done in a number of other cities. Estimated savings, 10 per cent of roughing costs.

ACOUSTICS:

BASIC CONCEPTS OF ENGINEERING DESIGN

by Robert B. Newman*

Noise control in contemporary buildings is increasingly becoming a significant design factor for the architect and the consulting engineer. In this issue, we parallel the 1960 AIA convention theme, "Expanding Horizons" with its emphasis on the correlation of the physical, social and economic sciences with all of the arts. This paper was presented before a conference conducted by the Building Research Institute, National Academy of Sciences-National Research Council, Washington 25, D.C.

Acoustics involve both physics and psychology, and we can not separate the two. I have been assigned to handle the physics end, but may touch on the psychological side, because the two are intimately tied together. The field of architectural acoustics is a reasonably well defined field of engineering. There is a lot we don't know, but there is a lot we do. We understand the basic mechanisms that control sound, both to make it and to suppress it. We've come out of the dark ages of merely hoping that acoustics would be good in finished buildings.

Noise control has two basic objectives: One, to establish a satisfactory environment, and the other to provide good hearing conditions. These are obvious. You will notice I have not used clear terms of definition. I have not defined "satisfactory," nor "good." We will try in the course of this two-day meeting to define just what is good, what is satisfactory and what is bad. It is important in discussing noise control not to confuse it with noise elimination. We must get away from the idea that quiet is the ideal. We know a great deal about the value of noise itself, and we know what is a satisfactory amount of noise in our buildings to make our buildings work. So, we will talk about the control of noise, of making it behave the way we want it to.

Most architects, engineers, builders and acoustical engineers realize that in many of our modern buildings, we have entirely unsatisfactory acoustical conditions. With the increased use of lightweight materials and the demand for flexibility, and movability, we find many owners surprised when the building doesn't work acoustically, and being disgusted with the architects or engineers who designed this unusable building. We even begin to wonder if architects are purposely making mistakes. However, I don't think we can say that. Most of the mistakes made in buildings today come from just plain ignorecho, or to get what we call "sound diffusion" into building has acoustical problems. Everyone knows that a music building presents acoustical problems, and a school auditorium must be given some acoustical thought, but how often do we think about acoustics in the office buildings, in the apartment house, in every single building type?

Every aspect of the design of the building, including the mechanical equipment, the structure and the surface finish material, affects the acoustics. We can not isolate the acoustics as something that we put in when the building is finished. We must consider acoustics at the very outset, in the basic design consideration of what goes into the building, or we're going to have a lot of surprises.

The other day we had a desperate call from a contractor down in Florida who had just put up a new ten-story office building for doctors and lawyers. Doctors and lawyers have a way of demanding a certain amount of privacy in their offices. They don't want their conversations with their clients to be audible to others. In this particular case, the architect had become intrigued with a new system of ventilation. He supplied the air through a plenum overhead, and each room had three slots running through the room across the celing to let air come down from the plenum. However, this plenum was unfortunately common to the entire space above the offices. They had a good plaster ceiling; but the only trouble was that you could hear every word that was said in every other office, nearby. Now, this building was all finished, and the tenants had moved into one of the floors before this situation was discovered and the contractor had to call for help. There is no solution to this problem short of major, extensive and expensive surgery, and this building can never be as good as it would have been, had this matter been taken care of at the outset.

We almost never see a bad situation that can be remedied as well as if the owner or architect had considered the acoustics from the very start. I could go on telling you tragic story after tragic story about this sort of thing. The world seems to be full of wretched new buildings with complete lack of privacy, reflecting complete irresponsibility on the part of the designer for providing acoustical controls.

Case history/fluorescent converters

I recently examined a new building in Texas that had a new type of fluorescent lighting system. It was an 800 cycle per second system, using 600 volt tubes and the engineers had put in a number of convertors to change 110-60 cycles to 600 volts, 800 cycles. These convertors were about 1 hp devices and had been bolted down to the concrete slab in the mechanical room. When you walked in the front door, you were met with a terrific amount of noise. After giving it some thought, the owners decided to disconnect the convertors from the slab and install some felt under them. After that things were much better. However, one of the company officials had a very quiet office, furnished with carpeting, leather chairs, etc. He had one of these fluorescent fixtures in a cove overhead, lighting a portrait of the founder. In this extremely quiet office, he could still hear noise from the fixture continuously, so we had to see what could be done about it. There was little to be done except to increase the noise in his office. This approach to the use of what we call "acoustical perfume," might be considered analogous to using perfume instead of bathing—you must understand how to use it. If you don't, you're never going to design very satisfactory buildings with our modern technology of lightweight construction; flexibility and movability. None of us thinks that we're going back to 8" brick partitions to separate offices in modern buildings—this just doesn't happen.

Case history/executive distraction

Another interesting situation was a building we looked at out in Ohio recently. The partitions had been terminated at a luminous ceiling. Now, there is nothing wrong with luminous ceilings, except that they are designed to control light, and have nothing to do with the sound aspects of the problem. In this particular case, the contractor who built the building told the owner that the sound was traveling from one room to the next because the wiggles in the plastic which formed the luminous ceiling picked up the sound waves, which were also wiggles, and they wiggled along the ceiling into the next room. Therefore, the owner was going to have flat plastic sheets substituted for the corrugated sheets. I know this sounds ludicrous, but it is really a serious matter. Another typical occurrence is what happened in a very fine new building in the Eastern part of the U.S. It is a large office building which has been much photographed and is therefore, "good." It has very lovely partitions in it, beautifully detailed. The executive offices are about 18 feet square, nicely furnished with desks, carpets, draperies, all the things that go with really high-class executive offices. Yet, secretaries complained that they couldn't take dictation because they could hear the official in the next office dictating at the same time. The level of distraction was truly amazing. There was almost no sound isolation between the offices, and this was high priced space—the partitions cost about $50.00 a running foot. So, the company decided to solve the problem by leaving every other office empty. This is expensive sound isolation, my friends, consisting of 18 feet square offices with $35.00-a-yard carpet and all kinds of fittings! Yet, the only way these people could get usable privacy and freedom from distraction was to move out of every other office. The owner was surprised and shocked. He felt that in this day and age we should have been able to predict this. And, of course, we can. There is no need for this kind of situation anymore, but it happens over and over again.

Case history/environmental distraction

Another incident involves a large engineering company in the midwest. This firm had been in a downtown location where they had all the advantages of lots of acoustical perfume. They had ordinary, old-fashioned windows that opened for ventilation, lots of traffic outside, and noisy air-conditioning. Then they moved out in the country into one of those stainless steel palaces for working and living. Here they had double windows, no traffic noises, fixed glass and a quiet ventilating system. The first thing that happened after they moved into the new building was a great rash of complaints about how noisy the building was.

Do we really mean noisy? Is it how noisy the building is or how quiet? By noisy they meant they could hear everything. There was no privacy. There was too much distraction. One of the officials who had enough weight to get what he wanted done, had his office fixed up. This was a typical modern building with movable metal partitions terminating at a perforated metal ceiling with sound absorbing mate-

Vice-president of Bolt, Beranek and Newman, Cambridge, Mass., Mr. Newman is Associate Professor of Architecture at MIT, and visiting lecturer on acoustics at Harvard and Yale. He is a Fellow of the Acoustical Society of America, past chairman of its Committee on Architectural Acoustics, and a member of the Board of Governors of BRI.

rial overhead. The architects and builders put in some gypsum board over the top of the ceiling to provide a barrier and things were a lot better. The official said, "It's better. I can't hear the man in the next office, but it really isn't too good yet. You see, he comes in every morning and tells his secretary a joke and now all I can hear is the laughter."

Mechanisms of sound control

As in every aspect of this business, there are no black and white answers to acoustical control. They are all various shades of gray. We can't say that 30 decibels is good and 40 is bad, or any other number. I don't know the meaning of those numbers, and none of the rest of us do. We have to realize it is all relative. It's a matter of what kind of noise we have, what kind of privacy we demand, etc.

As to the mechanisms of noise control, what we do about sound, how we control it, what the basic physical means at our disposal are, it is important to understand that sound is merely a physical motion of molecules in the air. We detect sound with our ears, and then it becomes a psychological problem, but our concern is with the basic aspect of sound in the air. This is simply a to and fro motion of molecules. The other day I had a conference with some school people who had been told that carpeting schools would solve the problem of noise due to use of flexible partitions; they thought they wouldn't need any more acoustical materials and that carpeting was a new approach for the control of sound. They also thought maybe there was something to this thing I heard about awhile back, that you could throw up an ultrasonic screen and subdivide a big left space into usable classrooms. They hoped that somehow there might be a miracle.

Absorption mechanism

We have two very simple mechanisms at our disposal, absorption of sound and isolation of sound. Although they are often used in combination, the basic physical laws governing absorption and isolation are completely different. Useful absorption of sound is provided by porous materials, materials with a texture similar to shredded wheat, materials which basically permit the sound waves to find their way in and out of this porous matrix, and, by frictional drag, to lose energy. In other words, when sound is absorbed usefully in the sound absorbing material, whether it is your hair, your clothing, the carpet on the floor, or the acoustical tile on the ceiling, it incurs a loss of energy in the form of heat. When we heat up these molecules, we heat up the air, we heat up the fibers, by frictional drag back and forth on these fibers.

There is no miracle to this; this is the way it works. A material to absorb sound usefully must have a certain value of what we call "flow resistance." It must resist the flow back and forth of the air. If it is too light and gossamer, it won't do very much to drag on the molecules in the air. If it's too dense, it won't let the molecules in; it has to be just about right. There have been all sorts of claims for miracle materials, such as, ⅛" thick materials which will absorb sound in a fashion never before possible. This is sheer bunk. Sound absorption of useful magnitude is given by reasonably thick materials, ½" to 1" or more thick, and they have to be porous and have the right basic characteristics.

We're often asked, "Can't you break up the sound? Won't that get rid of it?" No, it won't. A manufacturer of roof decks ran an advertisement a while ago which claimed that because the steel deck was ribbed, it would break up the sound and give a noise reduction coefficient of .45. This isn't so. A ribbed deck or a waffle ribbed concrete ceiling or any kind of a complicated shape will give a certain diffusion of sound, or re-direct sound energy. It's like the difference between the reflection from a glossy mirror and from a matte piece of paper. It merely scatters the sound energy, in all directions, but the energy is still there. The only way we can dissipate energy is with a porous, fuzzy material. I can't say that too many times. If we must dissipate it, we must dissipate it. To get rid of sound, we must reduce the energy to heat, and unless we heat something up, we're not going to get anywhere. The question is often asked, "What about skewing the room? Can't we just skew the room out of parallel, and won't that control the noise?" No, it won't. Redirection of sound energy by splaying walls and other forms of surface shaping is necessary in some kinds of spaces to control other problems like flutter echo, or to get what we call "sound diffusion" into listening spaces for speech or music. But, again, we've got to have the dissipating material present in the room.

Absorption is a very useful mechanism in controlling noise. In a given space, it controls the spreading of sound. Sound absorbing material on the ceiling reduces the spreading of sound from one end to the other. In an auditorium we want to spread the sound, so we don't put sound absorbing material on the ceiling. In the noise control situation, we do want to control the sound so we do put sound absorbing material on the ceiling. It controls the feel of the space and makes the space feel furnished. A worker feels that if good sound absorbing material is used, the other man's noise stays over there and isn't surrounding him from everywhere. We like it better when the space feels a little bit dead and the other person's noise stays with him.

We use absorbing materials for control of sound within a space, not by itself for controlling the transmission of sound from one space to the other. We can reduce the transmission of sound from one end of the building to the other, for example, in corridors by putting sound absorbing materials on the ceiling, thus reducing the speaking-tube effect. We also reduce the transmission of noise in ducts by introducing sound absorbing liners. All of these things are useful reducers of sound, and sound absorbers are useful in noise control, but more within the space than between.

Isolation mechanism

Sound isolation, on the other hand, which is the control of the transmission of sound from Space A to Space B is governed almost entirely by the weight and other physical characteristics of the partitions. You may say, "We all know that," but quite recently we looked at a "soundproof partition" which had been constructed in a hospital in Boston. It was made with two layers of perforated hardboard with a glass fiber blanket hung in the middle. The architect had put it there because this would be soundproof, which proves there still must be some misunderstanding of this very basic question. Isolation in useful quantity is given by virtue of the mass, by the weight of the partition component.

It's as simple as thinking about this piece of paper as a partition. These molecules in the air moving back and forth approaching it are trying to move the partition back and forth. If this partition has high weight and high inertia, it will resist this motion and won't re-radiate sound on the other side. It's just as simple as that. The heavier the partition, the more inertia it presents, and the less transmission we get through.

Factors of stiffness vs. mass

The stiffness of the partition, for example, influences its isolating characteristics, but basically the mass is the controlling factor. If we have a massive partition, it will resist the transmission of sound. We can not hope to get a high degree of sound isolation with a very lightweight partition. You may say, "I can't have heavy partitions in my building. I have to have partitions one man can pick up and move when the boss decides to rearrange the area." The answer is, if you have to have very lightweight partitions, then you will need a lot of noise in the space to make the environment a tolerable one with a reasonable degree of privacy. Leaks, creaks or holes, are the real depth of any partition system, no matter how good the isolator may be nor how heavy nor how much inertia it may have. If it is filled with cracks and leaks and holes or if it is surrounded with openings of all sorts, then it just can not perform as well as we would expect it to. We must put into buildings details to permit them to operate at full potential.

We must remember that when we ask a partition to give a noise reduction or a transmission loss of 40 decibels, we demand that it transmit only 1/10,000th of the incident energy, which is a very small fraction. This type of partition with a reasonable quiet background level might permit the audibility of raised voice conversations. The very tiny fraction of energy which can be transmitted means that any cracks or leaks, which have 100 per cent transmission coefficient rather than a 1/10,000 or 1/100 of 1 per cent, can very quickly overtake and completely nullify the value of the good partition component which we had to start with. We can't overemphasize the importance of detail, of sealing up the cracks and leaks to realize the full potential of any partition system we eventually decide to use.

This business of ultrasonic screens actually was proposed by some architects on the west coast as the new way to do schools. They visualized great left spaces, infinite space in all directions, with skylights to let in the light, and with ultrasonic screens used to divide the space into classrooms. You just can't go about sound control that way. We need actual physical sound barriers. If we can't get sound control with one barrier, then we may have to go to two or three in series, but there is no substitute for the physical control mechanisms. And, they must be used properly. They must be air-tight, and installed so they can behave as they really should. I don't think any of us working in this field thinks there is going to be any terribly new or different way developed to control the behavior of sound between spaces.

Often the question is asked, "What about partial height partitions? Can't we do something about them?" I saw an insurance building where partial height partitions had been used because the designer thought they looked better. The people involved in this particular situation were in personnel. Imagine a personnel department functioning with partial height partitions. In one case we know about, in the course of the first six months occupancy, there were four major leaks of personnel information picked up by people

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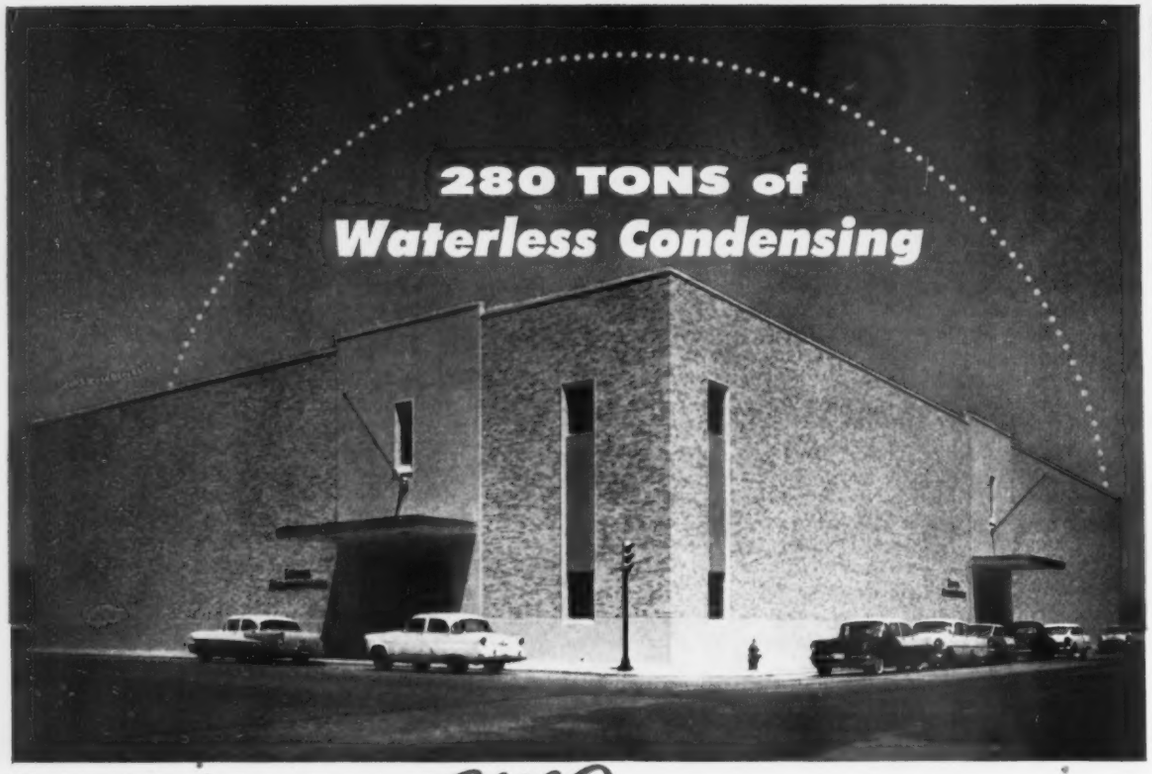

The Avalanche Journal Building, Lubbock, Texas. W. A. McMillan, Architects; Hedrick and Stanley, Engineers; Anthony Co., Mechanical Contractors.

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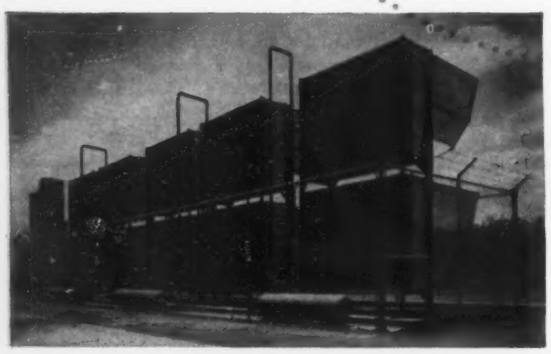

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ACOUSTICS: BASIC CONCEPTS

(*Continued from page 25*)

walking by in the corridor. At least the people in the next offices were in the same business, in that they were all firing and hiring. However, even idle passersby could hear about someone about to be fired.

A partial height partition is never a good sound isolation partition. If we have similar activities all over the building, if people are doing the same sort of thing, we can get by with a minimum enclosure with partial height partitions. I think in schools we can sometimes use part-high enclosures if all of the students are going to be engaged in the same activity in adjoining spaces. However, if the French class is singing a song while the English class next to it is conjugating verbs or taking a quiz, we have complete distraction and confusion, and then it won't work.

Equipment isolation

Recently, I went out to the mid-west to talk with some architects about an apartment house they were designing. It had apartments on ten floors including the first floor. Underneath the first floor was a basement given over to mechanical equipment including refrigerant compressors, not only for the apartment house, but for an adjoining ice skating rink, several steam reducing valves and all the air handling equipment for the apartment house. They said, "We want it quiet in the bedrooms overhead." My first recommendation was that all piping be hung on resilient isolators and a resiliently supported one-inch plaster ceiling be installed without any holes, leaks, or cracks. After considerable debate, I also told them they should think about putting this equipment in another building, and leave the basement for trunk storage. They did a careful investigation and found out that, in truth, it was a good deal cheaper to put the equipment in another building which didn't need any special provisions for acoustics.

We can engineer and make anything quiet you want, if you are willing to pay the cost of doing it, but we can often solve acoustical problems by putting mechanical equipment somewhere else. A case in point is a building in the southwest where all the mechanical equipment had to be on the top floor. Directly underneath was the executive office area with the best view, and company officials occupying this area wanted it especially quiet. The architect was planning to use a 2" slab on a metal deck and we recommended an 8" slab. In addition the plans called for a 3" layer of glass fiber blanket and then 4" more of concrete, with the slab, thickened to a foot wherever there was a machine. This meant 8" plus a foot, plus the sandwich layer in the middle, and they wanted a very good job of resilient isolation of the machinery. This called for a complete structural redesign of the building. It cost money both to redesign and to build, but it works. The owner of the building won't give us any money and go back and make measurements. He says he can't hear the machinery and he won't pay money for an acoustical engineer to make measurements on it. I agree with him. It's very quiet, it's fine, but it cost a lot of money. How much cheaper and easier it would have been to put this equipment in another building or in the basement, I don't know. But you who are responsible for the design of building can often save a lot of trouble and realize better buildings in the end by putting things somewhere else. When you must put noisy things next to quiet things, then you must apply the basic principles we have discussed above.

ARCHITECT'S ROLE IN STRUCTURES RESEARCH

by Myle J. Holley, Jr.*

The need for an improved inter-relationship between the architect and the structural engineer is stressed as we approach a new era wherein the complexities and the inter-actions of analytical methods and composite structural materials are forging a new frontier in structures research. Paralleling the 1960 AIA convention theme of "Expanding Horizons," we present Professor Holley's paper given before the "Research for Architecture"—an AIA Conference supported by The National Science Foundation, held at Ann Arbor, Michigan. Reprint courtesy, the national AIA Committee on Research for Architecture.

* *Professor of Civil Engineering, Massachusetts Institute of Technology.*

For one who is not an architect to prepare comments under the above title is, perhaps, to risk the accusation of presumption. It seems, desirable, therefore, to acknowledge a considerable ignorance of the professional architect (accompanied by a very real respect for his accomplishments), and to acknowledge further that these comments must in fact be a reflection of the writer's particular experiences in the teaching and practice of structural engineering. Through these experiences has come a belief that the cooperation between architects and engineers, which has so often been productive of outstanding designs, might well be strengthened in the area of structures research. Indeed in that aspect of structures research which has been mainly the concern of the structural engineer, namely the area of strength-stiffness behavior, progress would be accelerated through a closer cooperation of architects and engineers, including certain specific research activity on the part of the architects. The purposes of this paper are to establish the interdependent interests of architect and engineer in this area, to indicate major problems, research objectives, and methods of attack, to suggest participative efforts which might be sponsored or undertaken by the architectural profession, and to urge steps toward improved communication between the two professions.

Architect-engineer relationship

It should be unnecessary to argue the codependency of architects and engineers in the general area of design. Yet the very factors which demand their close cooperation sometimes create unfortunate misunderstanding and frustration. The architect has a primary responsibility for the conception of beautiful and useful structure in the great majority of buildings which our society requires. By training and breadth of viewpoint he is best suited to this difficult task. Yet this very breadth precludes his mastery of each of the many disciplines involved in the translation of his ideas into the reality of a completed structure. (One excludes, of course, the exceptional few who disprove the statement.) Accordingly he draws upon the talents of a number of specialists including the structural engineer. However, the relationship between architect and structural engineer is likely to be more delicate than the corresponding relationship with other specialists. The reasons are obvious. The structural engineer may be asked to judge the load-supporting capabilities of a form suggested by the architect, or to furnish a load-supporting system within the given form. His concerns are primarily with strength, stiffness, and economy, and to him the suggested form may be illogical, impractical, or even impossible. To the architect, on the other hand, the structural form may well be the very essence of his creation, and such criticisms are understandably unacceptable. Thus we hear the structural engineer accused of narrowness and lack of imagination and the architect accused of impracticality.

The foregoing description is, of course, somewhat overdrawn, and a harmonious cooperation is perhaps more typical. Still, in varying degree, the conflict does occur. It is perhaps intensified by the extent to which architects and engineers practice each other's role and thereby acquire a real or imagined competence in the other's field. For example, there are certain types of projects for which the engineer is logically and properly the principal, serving as creator and coordinator, but he may overestimate the range of situations for which his talents are adequate to such a role. On the other hand the architect, knowing that the solutions to many of the problems which he poses to the engineer are well within his own capability may become somewhat contemptuous of the engineer's contribution and he may overvalue his own ability to perform the latter's function.

These comments on factors which cause friction between architect and structural engineer are by no means irrelevant to a discussion of the architect's role in structures research. This friction frequently finds expression in the architect's exasperation with the engineer for the latter's inability to verify the strength-stiffness sufficiency of a suggested form. Sometimes this charge is unfair because the architect has, in fact, conceived a form which is totally inappropriate from the standpoint of load resistance. But it must be acknowledged that the engineer is at times quite unable to judge the suggested form, or unable to perform the analysis required for a judgement in the available time. In either event, through structures research and through education we may reasonably hope to eliminate this frustration. The engineer requires better understanding of certain aspects of structural behavior and better techniques for evaluating probable behavior of specific hypothetical systems. These will enable him to provide the architect with prompt judgments and perhaps with certain specific guides which will increase the frequency of favorable judgments. The architect requires, in addition, a better understanding of the general strength-stiffness characteristics of the various configurations which he adapts to his purposes. Without research these goals are not to be realized.

The foregoing remarks may suffice to establish the need for structures research and the potential values of research effort in terms of future capabilities of architects and engineers. It would, of course, be absurd to infer any general inability of the structural engineering profession to cope with the problems of building design in the present era. Rather it should be inferred that research is needed to insure that the grasp of architect and engineer alike shall not be needlessly shorter than their reach. A sense of urgency is perhaps suggested by the happy circumstance that we live in a time of rapidly lengthening reach.

The most promising areas of structures research may best be indicated by reference to what has recently been "conventional" in the philosophy of strength-stiffness analysis and design, and by comment on what may be viewed as significant modifying trends. The traditional concept of acceptable strength-stiffness behavior involves: (1) a useful range corresponding to elastic limit values of nominal unit stress; and (2) anticipated working loads limited approximately to the lower half of the useful range. "Structural analysis" has been concerned with methods of determining internal gross forces (thrusts, shears, bending moments) in component parts of structures. "Strength of materials" and the "theory of elasticity" have involved forces and the unit stresses and deformations which they produce. Experimental structures research has supplemented and modified theoretical relationships between internal gross forces and unit stresses on the one hand and member distortion and capacity on the other. "Structural design" has included the development of criteria for judging structural behavior and for proportioning structural components to assure desired behavior.

(*Continued on page 28*)

(*Continued from page 27*)

As the preceding paragraph indicates, the development of structural engineering has been dominated by the "unit stress" concept. Mathematicians, elasticians, and structural analysts have labored to produce techniques for evaluating the internal gross forces and the unit stresses in a variety of complex assemblages. It is in no sense a reflection on the value of their contributions to confess that the state of the art and science of analysis has constantly lagged behind the needs of structural designers. Where the demand for a specific structural form has been sufficiently insistent, the merit of that form sufficiently obvious, but the analytical tools inadequate, the engineer has utilized test data and judgment to formulate empirical methods of design to satisfy the demand. One might cite, as an obvious example, the reinforced concrete slab or plate although numerous other examples would do as well. Even in these instances of forced deviation from the strictly analytical approach, however, it should be noted that the end product usually has been a set of design criteria involving computed nominal unit stresses. Sometimes these *stresses* correspond closely to actual stresses; in other cases there is no close correspondence and they might more logically be given a different name. Parenthetically, it should be noted that lack of correspondence between actual unit stresses and computed values is not a matter for concern provided permissible values of the latter properly reflect the evidence of experiment and experience and thereby assure the desired behavior. Unfortunately some engineers assign to all computed unit stresses a degree of reality which is not always justified.

Unit stress concept too restrictive

The pre-occupation with unit stresses characterizing much of the modern history of structural engineering has been beneficial in some respects but unfortunate in others. Perhaps the most important benefit has been the development of practical methods and criteria applicable to the design of most of the structures which man has required in modern times. Wide acceptance of the logic of these methods and criteria, justified by a remarkably fine service record of actual structures, has permitted the codification of basic rules and the training of vast numbers of engineers capable of proportioning structures for satisfactory behavior. Without these the rapid technological progress of the past two centuries would not have been possible. However a number of developments of the recent past suggest that the unit stress concept of structural engineering is too restrictive and that it must be viewed as but one approach to the problem of proportioning structures for desired behavior. Failure to appreciate this fact has lead to a reluctance on the part of many engineers to undertake the proportioning of structural forms for which methods of stress analysis were not yet available. This reluctance has been particularly apparent when the demand for a new form was not insistent and when the scale of the proposed construction was deemed too large to permit the development of empirical methods through experimental data. Of course there always have been a few less inhibited thinkers able and willing to undertake the novel, engineers who have kept abreast of the latest developments in theory and in research results and who have pioneered the applications of significant new knowledge. That such engineers are never as typical of the entire profession as we would wish may be due in some measure to certain deficiencies in engineering education. It is so much easier to teach the mathematics and mechanics of analysis than to teach the realities of structural behavior or to generalize rules for fundamentally good design! The writer can report that this aspect of the problem is understood in some educational quarters and corrective measures are being undertaken.

Promising areas of structures research

The preceding comments will perhaps suffice to indicate limitations to the capabilities of the structural engineer which are inherent to the conventional methods of analyzing and proportioning structures. Fortunately, recent developments in several areas have provided at least a partial release from these limitations. Through research, a far greater freedom for the engineer, and thereby for the architect as well, can be achieved. Recognizing that any attempt to list the most promising areas of structures research, must provoke disagreement from those who are in any way involved, the writer nevertheless suggests the following:

(a) Applications of electronic computers to the problems of stress analysis.
(b) Extension of the ultimate strength and limit design concepts.
(c) Utilization of probability theory to relate working load and required strength.
(d) Development of model analysis as a source of general knowledge of prototype behavior and as a design tool.

Before commenting on the significance of each of the above topics, it must be emphasized that no implication of unimportance is intended by the omission of several others. For example, the continuing efforts of applied mathematicians in the fields of elasticity, elastic and inelastic stability, are essential to over-all progress in structural engineering. Similarly, widespread experimental research in the behavior of structural components must not be discontinued. These and other areas of structures research are omitted from the present discussion only because they do not reflect basic changes in concept or method.

Electronic computation

Within the structural engineering profession there is very great interest in electronic computation, and the use of this new tool is rapidly increasing. There are many structural forms for which methods of stress analysis, while known, have been too costly in time or money. The electronic computer removes this obstacle. Furthermore, this tool will permit the computation and tabulation of stress solutions for recurring structural forms, thus expediting the solution of specific cases. Under some circumstances the computer can be asked to select an optimum design in accordance with given criteria. Quite naturally both engineers and architects recoil in some horror at this latter application, but it is possible to assure them that there appears to be no reason to believe man's creative and analytical talents will be supplanted by the machine!

The electronic computer may perhaps be regarded as an infinitely superior slide rule. As such it will increase the structural engineer's capability of performing strength-stiffness judgments of proposed forms. Parenthetically, the architect too may find important uses for electronic computation in (nonstructural) areas of research which are not here under discussion. With regard to the architect's role in structures research the advent of electronic computation does not appear to be particularly significant. Perhaps it justifies a research effort on the part of the architectural profession with the objective of defining the recurring structural forms of greatest interest. It is not anticipated that electronic computation would be utilized in such a study, but rather that the end product of such research would generate strength-stiffness analyses by research groups of structural engineers.

Ultimate strength and limit design concepts

Ultimate strength and limit design concepts are not particularly new, but recent progress in this area has been rapid. Terminology employed by the proponents of these concepts is not completely logical. In the field of reinforced concrete ultimate strength proportioning implies that internal gross forces are determined on the assumption of elastic behavior but that component parts are proportioned for ultimate strength values which are specified multiples of the working load internal gross forces. Limit design implies proportioning of an entire structure so that collapse of the whole, or any component part, will occur at a specified multiple of the working load. The ultimate strength concept, as above-defined is noteworthy, first, because it dispenses with the unit stress criteria, second, because it has been adopted as an alternate method in the building code of the American Concrete Institute and, third, because it represents a first step in the direction of limit design. The American Institute of Steel Construction Specifications soon will permit the use of limit design methods, and the ACI Building Code probably will do likewise in a very few years.

It is to be noted that the limit design concept not only dispenses with unit stress criteria but also eliminates the elastic analysis for internal gross forces; the latter are obtained by the relatively simple application of equations of static equilibrium.

Thus far the ultimate strength and limit design concepts have been applied mainly to relatively simple structural forms (continuous beams and indeterminate frames) which were as easily handled by conventional methods. The incentives have been a more rational relation of structural capacities to working loads and consequent reductions in the required sizes of component parts. While these benefits are of some consequence, the implications of the concepts employed are much more significant in terms of their probable future application to structural forms for which unit stress solutions are *not* available. Although the desired behavior of a structural form cannot always be stated solely in terms of a required minimum failure load, this criterion often is of predominant importance. In such cases the significance of limit design concept is obvious.

There does not appear to be any occasion for the architect to participate directly in the kind of research effort needed to extend the application of this concept to more difficult structural forms. It does seem clear, however, that architects should become accustomed to thinking in ultimate load terms in order to facilitate communication with engineers in the future. Moreover, familiarity with ultimate load concepts is desirable in connection with possible participation in research related to the utilization of probability theory.

Working load and required strength

In the conventional approach to structural design, there generally is no attempt to relate the factor of safety to the specific conditions of a particular installation. Rather the factor of safety is implied by the ratio of permissible unit stresses to yield values of the material properties and by the choice of "design live loads" which may be somewhat conservative. The use of ultimate strength criteria rather than unit working stresses permits a more rational specification of factor of safety. On the one hand the computed ultimate strengths can be made to reflect the probable influences of uncertainties in material properties, degree of construction quality control anticipated, etc. Similarly the choice of load factors can be based on the probability of developing particular load intensities within the intended service life of the structure. This approach has, to date, seen little application, but is receiving increasingly serious attention. It appears to offer the possibility of much more rational relationships between loads and strengths. In the writer's opinion it is very much in order for the architect to familiarize himself with the concepts involved and to initiate research directed toward a better definition of probable loads.

Development of model analysis

Regardless of a constantly improving capability for analytical evaluation of structural behavior, it appears that this capability alone never will be completely equal to the demands imposed by newly devised structural forms. A supplementary technique is required, and there is reason to believe that this may be furnished by model analysis. With a few exceptions, this technique has been but very little explored. Indeed if but a fraction of the effort which has been devoted to the improvement of theoretical analysis had been spent instead on the development of model analysis, the latter would almost certainly be a thoroughly practical approach at the present time. For a few specialized structural types, (notably for dams) remarkably useful techniques have been developed over the past decade or so. There is every reason to suppose that these successes can be extended to a variety of important cases in the field of buildings, but a very considerable research effort will be required. One can imagine a time when methods of analysis involving models will supplement, though not supplant the theoretical approach.

In any research directed this way, it would appear that cooperation between architects and engineers would be most desirable, the architects contributing, in particular, suggested forms for general model analysis. In addition it would seem that a successful development in this area would be of immense assistance to the architect through improved understanding of the physical behavior of a variety of structural forms.

Much of this paper has been devoted to the reasons for present limitations in the field of structural design, and to the reasons why these limitations cause difficulties in the architect-engineer relationship. An attempt has been made to indicate how structures research can reduce these limitations and thereby improve the capabilities of architect and engineer alike. It is hoped that a better understanding of the structures problem may lead to better communication between architect and engineer and to joint effort, wherever possible, toward the common goal of finer structures.

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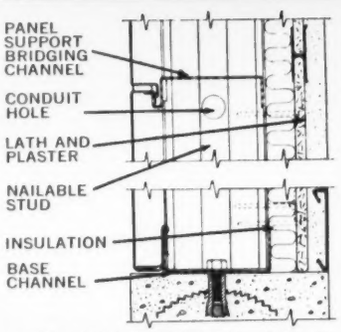

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ARCHITECTURAL RESEARCH FROM A SOCIOLOGICAL PERSPECTIVE

by Donald L. Foley*

Again, we parallel the AIA convention theme with Professor Foley's paper given before the AIA-NSF conference, "Research for Architecture." From the proceedings and reprinted courtesy of the national AIA Committee on Research for Architecture.

Architecture as a profession and architects as professionals clearly assume tremendous responsibilities. To meet these responsibilities in a mature manner appropriate to a major and distinctive profession, the practicing architect deserves to be provided with the best possible accumulated and tested knowledge. Adding to this body of knowledge and systematically disseminating this knowledge are provinces of research.

It is the thesis of this paper that the architecture profession needs to develop a keen sense of research-mindedness. This should be brought about as rapidly and thoroughly as the profession can convince itself of this need and organize to bring about the required changes. While suggestions as to such changes may come from outside, the major moves must inevitably be generated within the profession. In view of this, my paper has been developed so as to deal less with what sociologists are or might contribute—important as such contribution might be—and much more with certain "basic" directions which architects or architectural researchers may themselves be encouraged to explore.

I realize that I could readily be suspected from at least two directions: from sociology, in which I had my original training, for slighting sociological contributions; and from architecture, for having the effrontery, even though not an architect, to suggest to architects what they should be doing! By way of some explanation (and perhaps self-defense), I have come strongly to identify with the city planning profession and have been a member of a departmental faculty engaged in educating city planners to be. For the past three and a half years, I have also served part-time on the faculty of the college of Architecture, University of California. I have also served as chairman of the college's faculty research committee. During this period, eleven different other faculty members, mainly architects, have served as committee members.

Dean Wurster has enthusiastically supported our efforts and been patient with our rather slow pace. This committee has provided a continuing seminar for all of us, and I am greatly indebted to other members for such thoughts as I may be deliberately or unwittingly drawing from them. A sub-committee, at work for the past year, has completed a policy statement, which has now secured full faculty approval.[1] The responsibility for the present paper is, however, my own and I have sought to stress aspects of needed research that appear to be particularly justified from a sociological viewpoint.

This paper will be divided into three sections. The first will seek to spell out, in a rudimentary way, selected major interests of sociology as an academic field, but without bringing these to bear on architectural questions. The second will suggest some rather general reactions as to the possibilities for basic research related to architecture. And the final section will propose three subdivisions of potential architectural research that might benefit from collaborative work by architectural researchers and sociologists.

* *Associate Professor of City Planning and Architecture, University of California at Berkeley.*

MAJOR INTERESTS OF SOCIOLOGY

Sociology, as a field, studies the social environment within which people live. This environment is in many ways directly associated with the various other individuals with whom any one person deals; other people are highly important ingredients of any one man's environment. But this environment also involves a structural organizational aspect that, while including people as actors, may be studied at a level that conceives of the positions or niches ("social roles" in sociological parlance) that people fill rather than the people *per se*. Further, this social environment carries with it various expectations or norms as to how persons filling the various social roles will perform. The whole great web of expectations for a people—as to what their outlook on life is to be, what they are to be motivated toward, and what means they shall employ—we term culture. In sum, the sociologist conceives of the social environment as embracing persons, social organization, and culture.

Sociology, by now a sort of holding company of diverse interests, in turn breaks down into many subinterests.[2] Perhaps the heart of sociology lies in the study of social organization: how effort is divided among persons so that complex tasks may be carried out and how diverse and specialized efforts are fused into a single ongoing activity system. This includes the study of various major institutional segments, such as the family, government, business organization, religion, education, etc. It includes the study of formal organization, bureaucracy, and the place of informal groups in large, formal organizations. In the past decade or so there has been a considerable run of interest in studying the small group as a particular form of social organization.

Another major interest of sociology, shading into and sharing the attention of social psychology, is the relation between individual behavior and the individual's social environment. Here the concern is more for the ways in which and the degrees to which the social environment modifies or influences individual behavior. Also to be investigated, is the question of the role of the individual in altering or affecting the social environment, as in leadership, social change, etc.

An important area of sociological interest, yet one that in various ways is extremely difficult to study, is that of values. Social values are shared assumptions or convictions as to what is to be preferred or to be conceived as right. Values are conceived as comprising an essential part of our culture. How values come to be and how they are altered, and how they relate to various aspects of social organization are important questions. Social anthropology has historically dealt with this phenomenon of values and shares research interests with sociology.

Two final areas of sociological interest are population and human ecology. The first of these focuses on people as discrete, statistical units whose numbers, increase or decrease, and movement are susceptible of quantitative study. Human ecology particularly studies the adaptation of a people's social organization to the physical environment. This subfield is concerned with the interrelations between a people's functional organization, their technology, and the functional and spatial patterns of their communities. This latter interest merges into a related interest by geographers in human settlement patterns.

The central theme about which sociologists are in substantial agreement is the relatively great importance of the group factor in human life. This provides an approach which supplements that of psychology, that as a field tends to focus on the individual as the primary unit for study. Psychology and the popular lay pastime of psychologizing involve a relatively greater degree of interest in the physio-psychological mechanism of the individual. The sociologist, on the other hand, is concerned with the social environment as something to be studied and understood in its own right, at its own level of abstraction, and as an important intervening factor in mediating human reactions to the physical environment and to other individuals.

Sociology has long been rather differentiated as between those who have insisted on measurable, quantitative sources of empirical data and those who have held that the phenomena most deserving of study might not be readily or fruitfully susceptible to quantitative methodological approaches. This division between "hard-data" and alternative approaches is considerable. (As I understand the policy of the National Science Foundation for example, the "hard-data" approaches in sociology have been judged to be more directly eligible for certain categories of the Foundation's financial support.)

BASIC RESEARCH AND ARCHITECTURE

It is generally recognized that architecture, unlike such professions as medicine or engineering, has not been a research-minded field. If we may accept for purposes of this paper, at least, the definition of architectural research to which our faculty research committee agreed, as that inquiry which "seeks systematically and deliberately to add to the body of knowledge and conceptual approaches through which architects may gain greater understanding and from which they may draw with benefit in the course of their practice," then it seems evident that the architecture profession has not applied itself wholeheartedly to this as a distinctive task. And if we introduce even stricter insistence on the use of scientific research as a means of formulating and testing general propositions as a part of a body of theory, the gap between architecture and engineering, for example, seems even more pronounced.

Four propositions will be developed in the remainder of this section:

1. Architecture as a professional field will greatly benefit by openly promoting systematic research.
2. The architectural research that will prove to be the most basic is that which feeds into and helps to test architectural theory.
3. While scientific methods of conducting research should be introduced in architectural research

where applicable, there are cogent reasons why some aspects of architectural research should not be expected to conform to the tenets of academically respectable scientific research.

4. In general, architects must learn to take advantage of their own interests in varying their design solutions to establish comparative analytic studies of the results of that variation.

Benefits of architectural research

Research, particularly basic research operating at its best, connotes exploration. Research to be important should explore potentially important ideas. Characteristically, research focuses on concepts or relationships that have a general applicability to a given class of phenomena. Even though certain kinds of research (for example, reliance on case studies) may appear to be concerned in detail with the intricacies of particular situations, research generally seeks increased understanding of a generalizable sort. Hence, to gain this kind of understanding is another way of adding to our knowledge of what we may expect of certain phenomena under given conditions—in advance of such a circumstance occurring. Granted great philosophic and statistical difficulties in the exact reasoning employed, we may state in general terms that knowledge developed through careful research carries an element of predictability such that we may know more about what is likely to happen than we would have had we not carried out the research. By this token, we may expect that effectively designed architectural research should contribute to the generalizable knowledge upon which the architect may draw.

Research promotes intellectual rigor and healthy skepticism. One of the greatest challenges facing the researcher, and one which he must be trained to meet, is to achieve a clear formulation of just what his problem is. He should be able to cut through spurious relationships and to get to the heart of those relationships that most deserve to be investigated. The researcher, at his best, persists in asking what we really know or how we know it. Urged on by his own curiosity, he should be able to exert leadership in exploring whether ideas will stand up under test. This should encourage architecture as a profession to be more readily self-critical, hence gaining an understanding of weak points of those chains of reasoning on which the architect may wish to rely—in advance of subsequent criticism from outside the profession.

We should be careful not to promise too much in the name of research. What we might term "researchism" can be as unfortunate as "scientism." By 'researchism,' I mean the uncritical notion that all we need is research and somehow we can then solve any problem. Research should not be expected to solve complex problems at one fell swoop. Many of the problems of a clinical nature faced by the practicing architect, contain so many variables and call for such a great sense of judgment that they are not reduceable to clear, researchable terms. As we shall develop shortly, research can never be a substitute for the clear determination of goals or ends. Research will in few if any cases lead to the brilliant design solution! In many cases research will merely provide a greater understanding of reasonable limits of choice and will thus prevent serious errors where the designer might otherwise be tempted to go beyond these reasonable limits.

Research to be most helpful to architects should ultimately lead to better choices among certain al-

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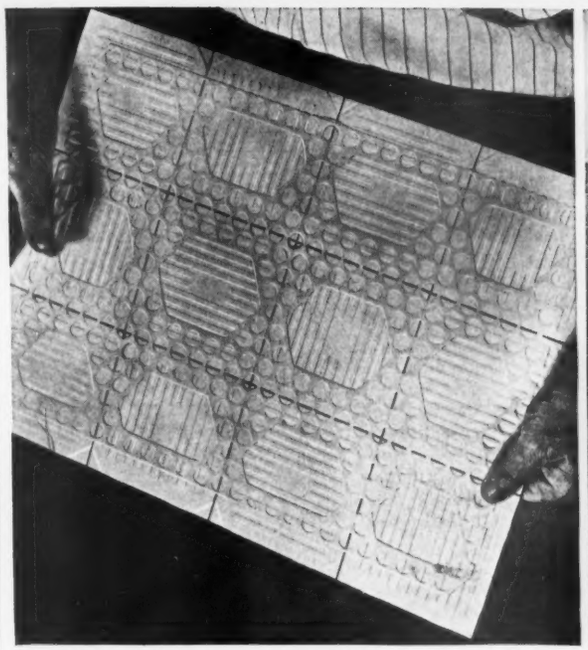

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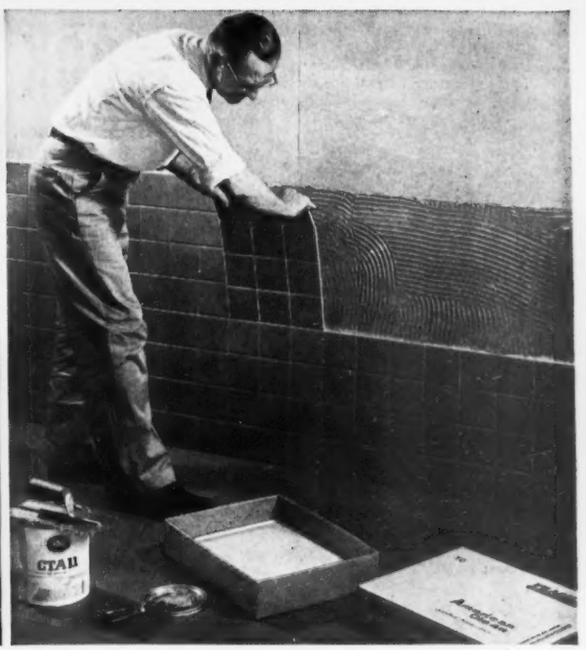

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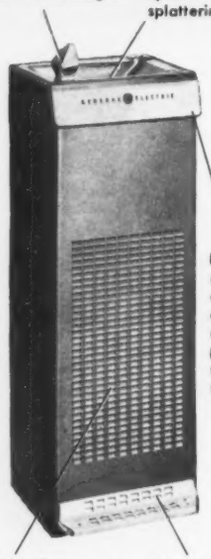
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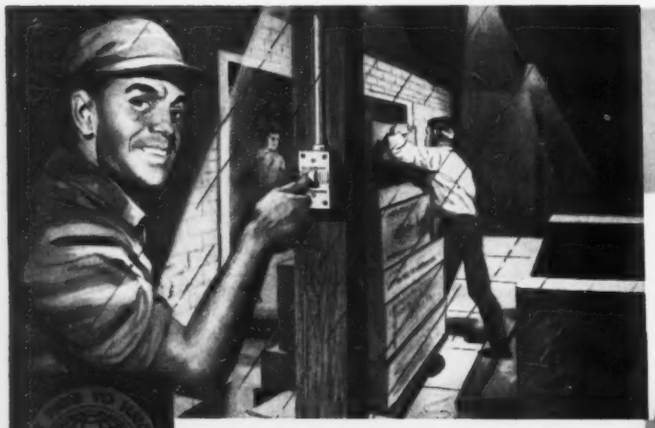

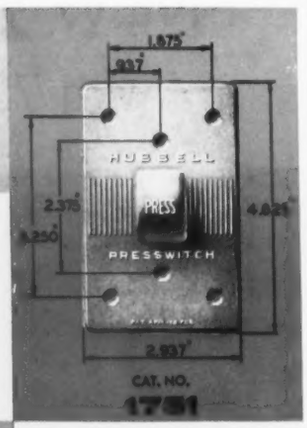

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(*Continued from page 31*)

ternative approaches open to the practicing architect. The research elements in the profession (or within the individual architect) should constantly be asking questions such as these: On what basis do you select this alternative rather than that one? How much difference would it make if you used alternative A, alternative B or alternative C? What is the assurance that the use of concept X will bring about Y reactions?

A sensitivity to the spirit and methodology of research seeking generalizable propositions should also feed into the quality of analysis employed by practicing architects in the course of their own practice. It should feed into the quality of analysis that might well be expected from architectural students taking architectural design courses. I would definitely recommend exposure by students to research approaches relevant to architecture, not to make researchers out of them, but rather to imbue in them a respect for what can be expected from research, to equip them to ask intelligent questions of researchers, and to provide an attitudinal basis for allocating to research a sufficient portion of those resources available within the arcihtecture profession so that architectural practice may be more adequately supported by knowledge.

Architectural research and theory

Theory may be conceived as a body of interlocking propositions. In an academic field—and this is our most common setting for theory—theory is tantamount to a model or a construct dealing with a major range of phenomena such that, although the number of variables is characteristically deliberately reduced from the corresponding world of experience, this model can handle many possible relationships and changes with the derivable outcomes not inconsistent with empirical observations of experiential events. For academic purposes we seek a framework that provides certain qualities of understanding.

Each profession also needs to develop approriate theory. Such theory, if we follow Ernest Greenwood's suggestion[3] (applied to the social welfare field, but applicable by analogy to other professional fields) that this takes the form of "practice theory," provides a systematic rationale on the basis of which professionals may practice. Such theory has many of the characteristics of academic theory and is at no point inconsistent with relevant scientific theory. But it differs from academic theory because it incorporates certain assumptions as to the goals of professional action (such as good health, a beautiful physical environment, etc.) and particulary focuses on propositions as to how such goals may best be reached.

The continuing formulation and refinement of what we may term architectural "practice theory" would thus appear to be of central importance. It is this task, I submit, that should lie at the heart of architectural research. As Robert Merton already has suggested in his November 1957 memorandum[4], basic architectural research will cut across what are sometimes distinguished as pure and applied research. What is basic research for architecture involves a range of intellectual explorations which can best be tied together by the formulation of various chains of reasoning applicable in the course of architectural practice. While such reasoning can take various forms and may involve considerable

complexity, we may suggest in an introductory vein that it must take into account: (a) the values that are judged to be the goals of professional effort; (b) the ways that people use architectural structures and spaces; (c) how architectural spaces are created, perceived, and reacted to; (d) how structural systems work: (e) how materials work; and (f) how the architect is to select from among many alternatives in resolving his design solution.

This suggests that architects who also gain the requisite training and motivation to become specialists in architectural research have a distinctive responsibility for weaving together an understanding of architectural practice, the rudiments of theory formulation, and the potential contributions from many related fields. But if one focuses on the interplay between architectural research and architectural theory, then it becomes apparent that a series of research findings pieced together from peripheral fields, no matter how excellent by scientific canons, may not be maximally relevant to the practice of architecture. Certain concepts and relations, particularly those dealing with the creating and the use and preception of space such as the architect is responsible for, will stand out as under-researched by outside fields. Conversely, certain frames of reference or conceptual schema that satisfy requirements for theory building in other fields may be ill adapted to the distinctive kinds of classes of problems faced by architects. The only hope here is for the architects self-confidently to build their own central theoretical framework and to use this in judging the relevance of peripheral research findings.

Research not necessarily scientific

The appropriate applicability and the limitations of scientific approaches to research should be understood, so that the development of basic architectural research may achieve an appropriate balance as between scientific and other approaches. We have already alluded to the idea that practice theory for a profession includes certain assumptions as to the goals of professional effort. While these may be recast or clarified in the light of scientific research, these goals reflect the values of the surrounding culture and the ideology of the profession. Hence, this component of architectural research, dealing with the goals of architectural design, is essentially ultra-scientific. It requires a sensitivity to what people need, what the profession interprets as its distinctive responsibilities, and what consensus-deriving mechanisms such as government conclude or proclaim.

Even beyond this identification of goals, we must recognize that architecture as a field has traditionally drawn heavily from related art fields and from the humanities. If the most critical conceptual problems facing the architect have to do with the creation of space, the experimentation and the inflow of key and highly imaginative ideas as to space may come from various visual-art fields, such as painting and sculpture. This is not to say that it may not be important to seek to reformulate certain concepts into hypotheses for scientific examination. But the exploration of the ideas calls for approaches that may not rely on customary scientific methods.

Architecture should definitely be encouraged to retain its strong art ties and its traditionally humanistic orientation. Among other reasons, it is unrealistic that too great a swing in professional ideology toward science would be appropriate or healthy for a field with the rich historical heritage that characterizes architecture.

But architecture must also come to realize that its practitioners deserve more than "rule-of-thumb" or "seat-of-the-pants" operating concepts. A major profession should not trust to chance that the experience of previous building or of analogous sculpture is funded and systematically passed on. It should seek to develop a strong body of empirically based propositions that will throw convincing light on the question of how much difference it would make whether the design is handled this way, that way, or some other way. Architects deserve tested laws showing performance characteristics as various dimensions or factors are varied, such as are more prevalently developed in engineering.

Comparative analytic studies

The potentialties for combining the natural inclination of the designer to provide "new solutions" and the interest of the scientist in comparative (and, if possible, experimental) research would seem promising indeed. A team effort is called for, such that the designer is actually encouraged to "experiment" in the buildings for which he is responsible and, by prearrangement, trained researchers study selected aspects of how much difference this makes. But do we see much of this spirit of designer-researcher cooperation? Certainly it is not being reported, if it is occurring in the United States. Vernon DeMars has recounted the time he was responsible for designing a farm resettlement project and he deliberately used one plan of siting housing in the first half of the project and another in the second half, hoping that someone would want to study the differential impact of the two site plans. The research has never followed! True, collaborative study gets undertaken in some foreign countries, notably Sweden, but American architects have not pursued this possibility.

In general, architects need to conduct methodological research (*i.e.*, research as to what research method to rely upon) as to how they can most effectively analyze alternative design possibilities. Architecture as a profession generally seems to be committed to suggesting a single design solution to the client. The standard and plausible explanation is that if two or more tentative solutions are offered, the client will inevitably say that he wants certain features from each and will tend to insist on them. This presumably plays the devil on the resolution of an ultimate solution, and the architect wants to avoid this. But the idea of presenting the single solution may leave it unclear, both to the client and to any outside observer, just what alternatives were studied and what were the relative merits or shortcomings of these alternatives.

In many cases the examination of alternatives involves essentially economic analysis, in the sense that the relative benefits and costs of alternatives deserve to be appraised. A highway engineer will undoubtedly seek to explain what the differences are in both cost and performance as between different thicknesses or alternative mixes of concrete. The final solution, if rationally determined, can suggest a thicknes and a mix that best balance the minimization of cost and the maximization of performance.

In the course of the intelligent analysis of alternatives there logically evolves a sense of model building (in the scientific theoretical sense, rather than a three-demensional architectural model). That is, key conceptional variables or dimensions come to be hypothesized; ways of analyzing their interdependence in simplified or ideal form are then developed; and the study of alternatives in terms of limited-factor analysis is undertaken. Successive refinements could permit analytically superior models. In this endeavor architects could learn by analogy from various other fields which have already committed themselves to this kind of analysis.

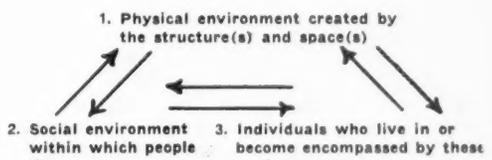
An important logical difficulty is the simultaneous handling of many variables. The simplest experimental comparisons tend to follow the pattern of holding almost all factors constant while deliberately manipulating only one variable or at the most a very few variables. And yet the architect must incorporate into his design dozens or hundreds of variables—and all at once. It is important to stress the distinction between the experimental analysis potentially available for the researcher and the design-decision process that must be relied upon by the practicing architect. As in any situation calling for accurate diagnosis, the human mind must be willing to serve as its own computer, capable as it is of taking complexities and subtleties into account so superbly. But appropriate comparative analysis can help the designer view certain alternatives in such a way as best to draw upon tested principles as to performance, behavior or reactions.

In sum, it would seem essential that architects develop a spirit of reliance on, and the methodological know-how to be capable of, systematic comparative analysis of design alternatives with which they are confronted.

POTENTIAL ARCHITECTURAL RESEARCH

"Commodity, firmness and delight" have long been recognized by architects as essential criteria that an architectural structure is expected to satisfy. These three terms also suggest equivalent major divisions of architectural practice theory; functional, structural and aesthetic. From a sociological viewpoint, the first and third of these are of more direct concern than the second. Structural analysis, while crucial for architectural theory and practice, relies more on engineering and its supporting physical-science fields than on sociology or other social science disciplines.

The sociologist, focusing as he does on the nature of the social environment, naturally tends to stress the potential importance of the social environment as a kind of factor intervening in various ways between the physical environment created by the architectural structure and the persons accommodated by that environment. Diagrammatically, this interest may be expressed as:


1. Physical environment created by the structure(s) and space(s)
2. Social environment within which people live
3. Individuals who live in or become encompassed by these environments

For certain purposes it is sufficient to focus on *1*, as in questions of structure and materials. From a physio-psychological viewpoint it may be most relevant to analyze the relations between *1* and *3*. Thus the important study of climatic control or the examination of many perception considerations. The sociologist seeks to remind both the architect and other researchers that there are important chains of relations from *1* via *2 to 3* or from *3* influenced by *2* to *1*. For example, the social groupings that may

(*Continued on page 34*)

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be deliberately or unwittingly encouraged by the architectural spaces in turn have their own kinds of impacts on the participants. And the reactions of persons to the building may be considerably influenced by their subculture and by interaction with their peers or opinion leaders.

In the remainder of this paper, we shall limit ourselves to identifying and discussing three main research directions:

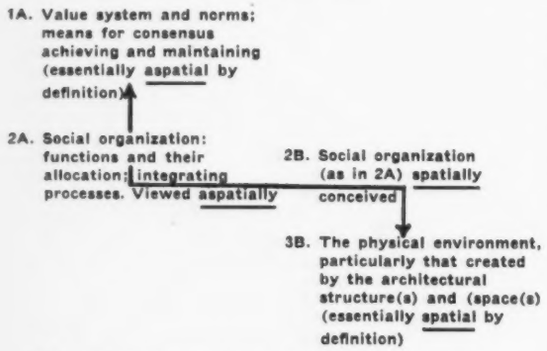
1. The social organization of the activity unit to be accommodated.
2. Social factors related to perceptual and aesthetic reactions to architecture.
3. The sociology of the architecture profession.

Each of these in its own way provides a very relevant framework within which a wide range of factors bearing on architectural design decisions may be understandingly approached. Each facilitates a very broad cultural and organizational context being taken into account and being brought to bear on architectural design problems.

Social organization of the activity unit

This first subsection proposes that major research effort be expended such that architects may gain the best possible understanding of how the activity units for which they are called upon to design architectural structures are organized and function. While this phase of architectural research and theory development would inevitably involve a certain sense of unique orientation as best relates the study of organization to the primary interest of the architect in creating the best possible housing and space arrangement and quality, it should also take into account and be congruent with the many-faced attacks on organization and organization theory developed by sociologists and other social scientists.

While the task of the practicing architect is largely clinical, in accurately diagnosing the configuration of features uniquely characterizing each situation, the challenge confronting the architectural theorist and research is to identify those classes or categories that most appropriately designate kinds of patterns, relationships, or functions about which generalizations may be developed and tested. In very brief form, we shall suggest the rudiments of a conceptional framework. This could serve as a setting within which the more specific research efforts may be viewed with some sense of perspective. The following diagram presents the major elements of the proposed framework:[5]


1A. Value system and norms; means for consensus achieving and maintaining (essentially aspatial by definition)
2A. Social organization: functions and their allocation; integrating processes. Viewed aspatially
2B. Social organization (as in 2A) spatially conceived
3B. The physical environment, particularly that created by the architectural structure(s) and (space(s) (essentially spatial by definition)

This suggests a major chain of reasoning, so to speak, that may be applied to any activity unit for which an architect may be called upon to design a structure. Whether the unit is a family, a business firm, a manufacturing corporation, an elementary school, or a recreation center— these elements would seem to be relevant. This framework suggests various interlocking propositions that deserve to be hypothesized and subjected to empirical test. This or other frameworks and the propositions principles evoked could provide a basis for one major aspect of architectural theory.

From a sociological perspective, the major focus might well be on *2A*, the character of the social organization. For purposes of developing architectural theory it is essential to develop generalizable propositions that could apply, as relevant, to many specific organizational units. A sophisticated classification of *kinds* of organizational units, in terms of what are judged to be the architect's primary responsibilities, is called for. Also required is extensive methodological research aimed at equipping the practicing architect with the best possible analytic concepts and techniques. But more important, in our view, is the need for systematic examination of the fundamental relations between each of the steps *1A* to *2A*, *2A* to *2B*, and *2B* to *3B*.

The first relation, *1A* to *2A*, is particularly adapted to sociological investigation. It features the interplay between values and norms, on the one hand, and the functional organization of the activity unit in question, on the other. Presumably the functional organization is so formed that it will best faciiltate (and not impede) the values sought. The identification of alternatives regarding functional organization and analyses of their relative merits are important. Since the functional organization incorporates technology, it tends to be subject to greater change than are the values. This may result in cultural lag in which values may be out of phase with the organization. From an architectural designer's position, how are discrepancies as between the professed values and the functional organization of the unit to be handled?

The second step, from *2A* to *2B*, is a critical one for architecture, for it involves the important transition from aspatial to spatial.[6] It is with respect to this step that the architect should be in a strong position to provide professional advice to his client, and should be able to draw on relevant tested principles regarding this relation. Here the question is what difference it makes to the functioning of the organization to vary the spatial arrangement of that organization. Take as an example the question of how much difference it makes whether an organization is housed on one floor or on two or three floors. Or in the internal arrangement of an office building, how much difference would it make whether the heads of four departments are dispersed spatially so as to be at the center of their respective units or whether these four department heads are housed together in an executive suite as nearly adjacent to the four departments as possible? If a university building were being designed to accommodate several departments that together constituted a college unit (one of several such units within the larger university), how much difference would it make to put all the graduate-student spaces together, thus cutting across department lines, as against housing the graduate-student space separately within each department? The solutions to these and many other questions—faced jointly by architect and client—may vitally affect the subsequent functioning of the organizations in question. Is it not reasonable to assume that architecture as a profession should develop the best possible knowledge of the implications of spatial arrangement on functional organization?

The final step, from the spatial pattern of the social organization to the physical environment of the structure *(2B* to *3B)*, while of first-rate importance to the architect, may be les amenable to sociological inquiry. But even the constant reminder to the architect and to others that the organization or the activity system being accommodated is something separate from the architectural structure or shell is fundamental! The organization may be rather susceptible to change during any future period of time, and we may posit the notion of *physical environmental lag* (conceptually parallel to that of cultural lag, suggested earier). This suggests that the shells of the structures, inevitably designed far in advance of the main lifetime of the activities to be accommodated by the structures, will tend to be relatively fixed and may impede organizational growth and change. What are the theoretical alternative ways by which structures may handle inevitable functional change? How well do loft-style structures, such as are now being used in the contemporary design of large office buildings, work over a long time period?

What has been suggested here, in summary, is that by a chain of reasoning we may move either way via the central concept of social organization as between the values or goals to be achieved and the physical design of the structure. This also places open emphasis on the transition from aspatial to spatial, which we are convinced may be conceptually dealt with most profitably at the social organizational level. Putting the chain of reasoning in the 'S' shape encourages each of three steps to be taken one at a time: first, the transition from values to social organization, both aspatially viewed; second, the relation of aspatial to spatial, both at the organizational level; and third, the distinction and the relation between the social organization and the physical environment; but both in spatial terms.

Social factors related to architecture

In this subsection I am recommending that research be undertaken to identify important features of the social climate within which the architect works and the future social climate in which the structure he is designing will enjoy its life. A major feature of such research would be to gain understanding of the way in which social values and other social forces impinge to influence how persons or groups will react to or evaluate the product of the architect's design.

Architecture as a profession has the very distinctive responsibility for producing lasting structures, which in turn define spaces, that come to provide an essential part of man's physical-visual environment. The structures, therefore, must not only work in the sense of accommodating the activities that will go on in or about them; they must stand the test of looking well. This immediately moves us not only into a perceptual field of inquiry but also into an aesthetic sphere. For how does one judge whether the structure "looks well?"

While we do not underestimate the importance of research on perception, we assume that this is in great measure a field most properly discussed by a psychologist. As phases of such research, we would merely suggest: (a) research as to the effect of the social and cultural situation on an individual's perception and attitudes; and (b) studies of the social climate or segments of this climate that bear

on reactions to architectural structures.

In either of these phases, and they are of course interrelated, there are clearly many parallels with other kinds of research: studies of popular culture, consumer behavior, cultural and attitudinal change, the role of those charged with intellectual or artistic leadership, etc. Some of these studies are concerned with the rather broad trends of social and intellectual history. Other relevant studies shade into research on the architecture profession. These will be discussed below.

Social psychological studies of how people perceive and react to architectural features—reactions to the exterior of structures, to the spaces created in the interior of these structures, etc.—should take into account the group membership and the subcultural environment of each subject studied. Architects, like most professionals, tend to reflect not only attitudes induced by their own education and professional contacts but also an essentially middle-class outlook. How do persons from other social classes view architectural structures? Herbert Gans has reported some participant observational studies in a lower income, Italian area of Boston wherein the familial and interpersonal contacts that loom as the most important part of their environment and the character or style of housing would not seem to be very prominent in their minds.[7] This is in considerable contrast to the attitudes held by the middle-class family on the social make, for whom the house may be a very important symbol of status. Architectural "pleasantness" often seems to be correlated with the most socially respectable areas of the large city.

A phenomenon that deserves greater study is that of tract residential building. Here an entrepreneur generally accepts a great responsibility for discerning what the prospective home buyer wants and what he can best offer them within the price ceiling or range at which he decides to operate. While some architects seem encouraged with the general rise in quality of such suburban housing during the past decade or two, and while in selected instances (Eichler homes in the Bay Area, for example) architects have had a strong impact, in general this mass production of single family homes has been beyond the control or even the direct interest of the architecture profession. What may be learned by research on owners' preferences and developers' interpretations of these preferences?

We lack systematic studies of how persons of backgrounds and social positions that could be meaningfully classified react to specific kinds of architecture. When significant architectural contributions appear, they tend to be illustrated and briefly discussed in various architectural magazines. But what do we ever know of more general reactions? What basis can we develop for forecasting the public reactions to a prospective building?

While we have considerable activity in the history of architecture, and historians serve as critics in interpreting the relation between trends in architectural style and social periods and forces, we do not have rigorous comparative and empirical study of the conditions under which certain kinds or styles of architecture have or have not gained popular acceptance or acclaim. This was dramatically illustrated to me by a recent research proposal developed by an architecture graduate student from Thailand, who became curious about the probability that contemporary architecture might be accepted for reli-

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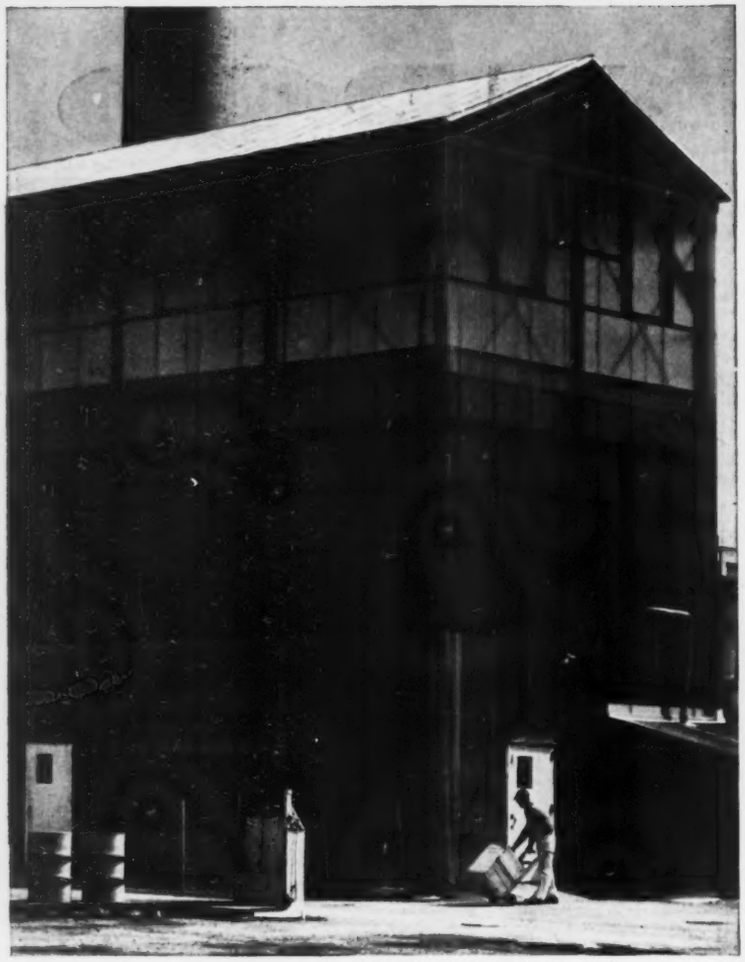

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gious temples in his native country. This propelled us as a seminar to discuss how it was that new ideas gained favor or were resisted in a country such as his, and to what extent we would expect that reactions to architectural style would or would not follow the pattern of reactions to other kinds of innovations.

Some thoughtful intellectuals are questioning the effect of the large "projects"—apartment projects, large shopping centers, etc.—toward which we have been having a great run.[8] While the large projects provide great possibilities for integrating functional requirements and introducing a unifying aesthetic, they also run the danger of providing rather cold and even brutal effects as compared with the results of many years of more individualistic development. This becomes a major problem for civic or urban design: how do people react to various major alternative approaches? Are the values favoring newness and bigness so much a part of our American culture that the great architectural and engineering projects become symbols that are welcomed? To what extent do people want to hang on to the traditional? I was riding a bus the other day and was suddenly aghast that what I had always though of as a lovely old Victorian house had been torn down to make way for an apartment building. A lady behind me remarked to her friend: "Isn't it a wonderful sign of progress when those old places can be replaced with nice new buildings?"

Clearly the architect needs more than facts as to how other persons react to various kinds of architecture. His practice theory must include a clear sense of his role as a member of an elite that is charged with providing structures of good taste. Some clients, for whatever combination of reasons, seem to know this is what they want and are willing to pay for architectural services in order to achieve it. But what further responsibilities does the architect have on his behalf of "the public interest?"

Sociology of the architecture profession

This final subsection suggests that a research spotlight be directed at architecture as a profession in order to show the influence of its profession subculture and its traditional approaches on the process by which design takes place and on the character of the product designed. This also fosters the examination of the play of many external forces as to the adaptability of the profession to changing needs or revised interpretations of needs.

The publication in 1954 of the two-volume *The Architect at Mid-Century* marked a singularly notable effort at self-examination on the part of the architecture profession. Continuing research is warranted. The challenge here is to hold mirrors up to architects so that they perceive themselves and their values and operating traditions more accurately. By focusing on the subculture, that, in effect, blankets the architecture field, it is possible to identify the kinds of assumptions that architects most readily take for granted and which they themselves lose sight of because they seem so "natural." Research comparing architecture with other professions will demonstrate to architects the way in which they are alike or different from these other fields.

One of the most important segments to be examined is architectural education. Just how is the novice trained? How does he become imbued with

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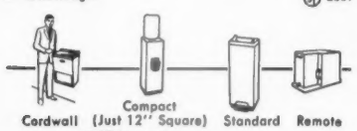

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the attitudes that the professional is expected to hold? What are the relative places of the architectural school and the initial office experience in the young person's induction? What are the roles of the professional schools as they seek both to represent the architecture profession and also to adapt to the educational philosophies of their host universities?

How is research dealt with by the profession? What are the roles of architectural schools with respect to research? To what extent do the attitudes taken toward research by architectural school instructors become reflected in subsequent reactions by young professionals?

Deserving study are the relations between architecture as a profession and related professions—engineering, landscape architecture, city planning, etc. This includes jurisdictional disputes and ideological differences. It includes patterns of collaboration.

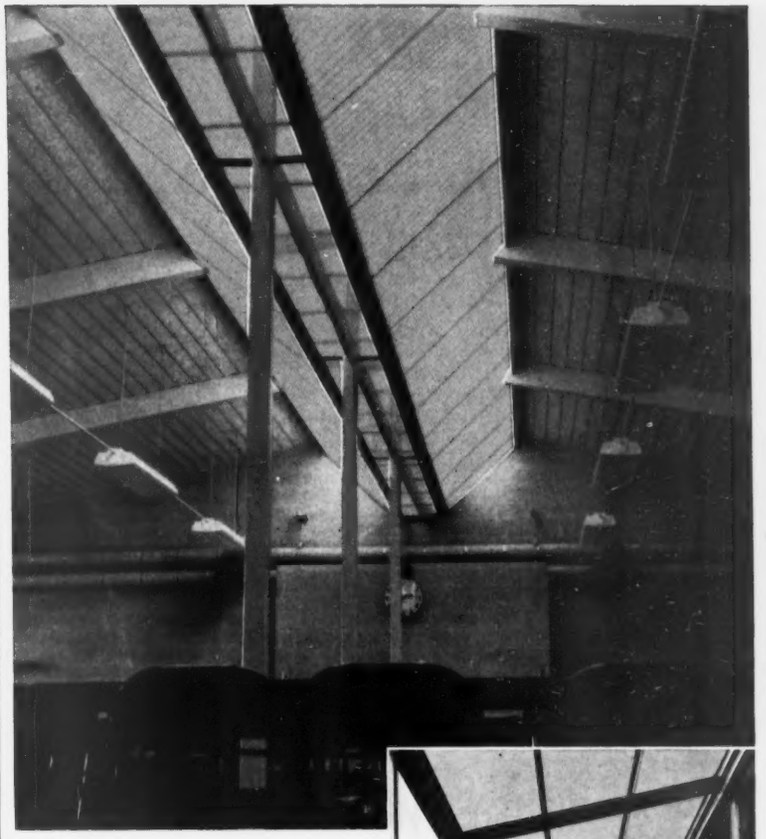
Included, too, should be the study of professional organizations, particularly the place of the American Institute of Architects. How effective is the leadership developed through the national and the various sectional levels of this major organization? In what ways does the AIA assist the profession in adapting to changes? In resisting changes?

The study of how architects communicate, with each other seems to be a particulary profitable area for study. It relates, incidentally, very meaningfully to the whole question of research-mindedness which we have been dealing with in previous sections of this paper. If, as it appears to a participant observer, architects tend to communicate mostly through pictures of or visits to see the final products of their design, what assurance is there that the same major and generalizable ideas that may have been developed in the course of the building's design are being similarly communicated to all who see the building or pictures of the building? We take for granted that for communication via medical journals the researchers and occasionally practitioners collect similar *classes* of cases and report on the class (even though they may have relied on a sample of only 22 cases). But we seldom see classes of phenomena dealt with in quite this way in most architectural magazines.

Many architects have told me that great reliance they must place on the sales representatives or manufacturers' literature for information about products they may be considering using. Do architects also work this way in finding out information about other aspects of problems facing them? To what extent do they rely on indexes and abstracts to research on performance characteristics, function-space relations, etc.? How intelligently are those information-cataloging services that are functioning used by members of the profession?

Two final suggestions relate to the organization of the architect's office and the nature of the relations between architect and client. As *The Architect at Mid-Century* suggested, there is an important question as to the correlation between architecture school training and the roles assumed by graduates of such schools as they work their way into medium or good sized offices. What array of functions and skills must be mobilized in addition to the role of key designer? In the interaction between architect (or his representatives) and client (and the various persons representing his organization) lie tremendously important considerations for study. What

(Continued on page 38)



Architects: Commonwealth Architects and Engineers, Godwin W. Draper
General Contractor: Ivy Construction Corporation, Charlottesville, Va.
Panel Erector: N. W. Martin & Brothers, Richmond, Va.

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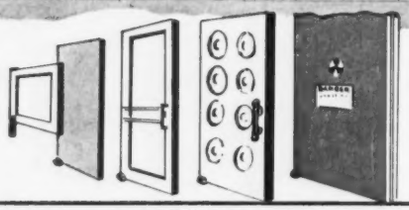
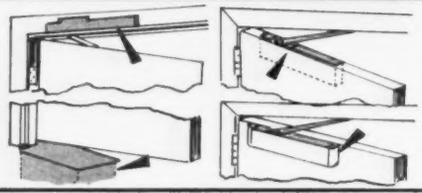


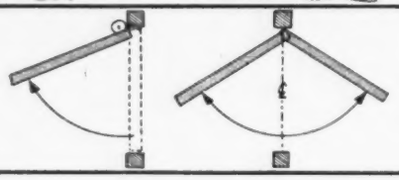
styles for doors, 12 lbs. to 1200 lbs. — light office rail gates to extra heavy lead-lined doors.

CLOSER MOUNTING requirements



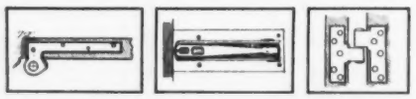
styles for mounting in the floor, in the jamb, in the door, on the door.

DOOR ACTION requirements



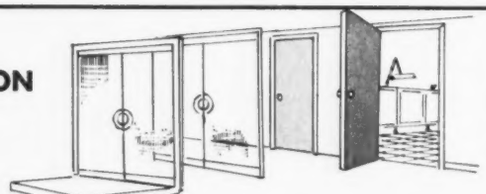
styles for single acting and double acting—both light and heavy doors.

DOOR HANGING preference



styles for offset hung doors, center hung doors and butt hung doors.

DOOR LOCATION requirements



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(Continued from page 37)

are the various kinds of relations that are likely (ranging, for example, from the very dominant architect to the very strong-willed client)?

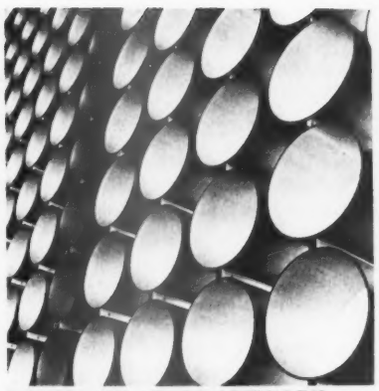
In this section I have limited my discussion to three proposed research directions. May I also remind the reader that a considerably broader classification of architectural research that an architectural school might consider undertaking or promoting is contained in the architectural research policy statement recently completed by the research committee, College of Architecture, University of California.[9] This will provide a more general perspective, rather than one that is deliberately sociological in its orientation.

Footnotes

1. Research Committee, College of Architecture, University of California, "Policy Statement on Architectural Research, College of Architecture, University of California," December 1958. Mimeogr. The subcommittee comprised Sami Hassid, Chairman, and James Prestini.
2. For a contemporary review of these subinterests, see Robert K. Merton, Leonard Broom and Leonard S. Cottrell (ed.), *Sociology Today: Problems and Prospects* (New York: Basic Books, 1959).
3. Ernest Greenwood, "Social Science and Social Work: a Theory of their Relationship." *The Social Service Review*, 29 (March 1955), pp. 20-33. Reprinted under the title, "Relationship of Science to the Practice Professions," *Journal of the American Institute of Planners*, 24 (Fall 1958), pp. 223-232.
4. Robert K. Merton, "Some preliminary notes on problems and prospects of Conference on Basic Research in Architecture," Memorandum to Walter E. Campbell, Chairman, AIA Committee on Research, November 4, 1957. Mimeogr.
5. I wish to express my indebtedness to the Resources for the Future, Inc., for a grant to the University of California which has made it possible for a small team of scholars, under Melvin Webber's chairmanship, to explore certain theoretical approaches to the spatial organization of metropolitan communities. The essentials of this diagram were developed in that project and will be reported in a forthcoming publication.
6. It is possible that the term, "aspatial," is not the best to use here. We do not want to say "nonspatial," because we do not mean that the organization is not in space or does not have a spatial pattern. By "aspatial" we mean the discussion of a phenomenon without even thinking of its space aspects. Walter Isard, for example, has demonstrated that the Anglo-Saxon intellectual stream of economic theory has been essentially aspatial, implicity assuming that economic activity takes place at a single point in space. A rather different German approach sought to take space into account.
7. Herbert Gans, "The Human Side of Redevelopment and Relocation Planning," *Journal of the American Institute of Planners*, 25 (Feb. 1959), pp. 15-25.
8. See for example Nathan Glazer, "Why City Planning is Obsolete," *Architectural Forum*, 109 (July 1958) pp. 96-98, 160 f.; Jane Jacobs, "Downtown is for People," in the Editors of Fortune, *The Exploding Metropolis* (New York: Doubleday, 1958), Ch. 6, pp. 157-184.
9. See footnote 1 above.

PRODUCTS, EQUIPMENT, MATERIALS

Report of recent developments by industry, based on data furnished by mfrs. Inquiry cards for further information face pages 1 and 80.



NONMODULAR GRILLEWORK OF ALUMINUM

MFR'S DESCRIPTION: solar screen fabricated from lightweight, anodized aluminum alloy introduced, called *Grillewall.*

USES: in residential, commercial and institutional structures.

SPECS/FEATURES: corrosion-resistant unit features self-assembly concept in form of dovetail joint said to eliminate riveting, welding, special framing and all visible bolted connections. Rings may be fabricated in any desired depth, affording wide range of designs and shapes. Intended for use as complete facade or in combination with other material. Mfr states material reduces peak loads in air-conditioning by deflecting source of heat and providing maximum glare protection with minimum of light loss.

AIA FILE NO. 15-J

MFR: INTEGRATED CEILINGS & GRILLEWORKS, INC.

Circle 200 for further information

ELECTRONIC SYSTEM FOR LANGUAGE STUDY

MFR'S DESCRIPTION: *Electronic Learning Center* offered as integrated, electronic system for foreign language instruction.

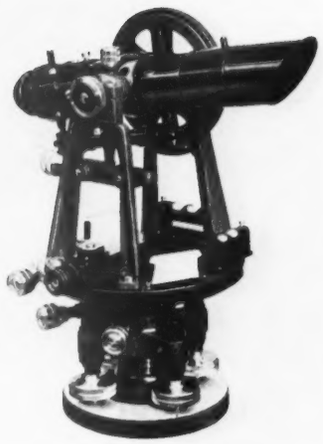
USES: school installations for instruction in foreign languages, speech therapy, remedial reading and voice training.

SPECS/FEATURES: system permits teacher, with switchboard arrangement controlling 16 tape channels, to give individual instruction to each class member, using tape recorded lessons transmitted through earphones. Students in soundproofed cubicles, have microphones for responses which may be recorded and played back for purposes of evaluation. Teacher, through use of monitoring control, can check student work or provide special tutoring in two-way conversation. Among features of system: teacher's console desk of steel construction; transistorized amplifiers for easier servicing and reduction in equipment size; construction of student stations in connected units of two and four for varied classroom arrangements; and swivel chairs for student comfort.

AIA FILE NO. 31-i-7

MFR: AMERICAN STANDARD CO.

Circle 201 for further information



TRANSIT WITH ROTATING OPTICAL PLUMMET

MFR'S DESCRIPTION: *Tropl,* recently developed optical plummet transit, offered at low price.

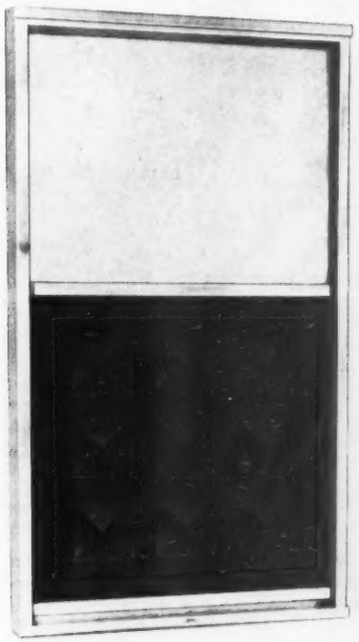
USES: in surveying.

SPECS/FEATURES: said to eliminate dependence on plumb bob when setting up in wind, and to afford greater setting-up accuracy than transits with plum bob. Optical plummet rotates with instrument, enabling cross check on the point; focuses for short set-ups or deep sights. Shifting head reportedly has twice usual shifting distance. Telescope has reversion bubble, side focusing and gun sight.

AIA FILE NO. 35-N-8

MFR: FENNEL INSTRUMENT CORP. OF AMERICA

Circle 202 for further information



FORMED PANELS FOR CURTAIN WALLS

MFR'S DESCRIPTION: *Syntek Contour Panel* developed to widen range of creative exterior design.

USES: exterior curtain wall construction.

SPECS/FEATURES: panel face is formed of *Plexiglas,* lightweight material reported to have excellent weathering characteristics. Available in 22 colors, panels can be custom formed with designs to meet architect's specification. Guaranteed for five year period.

AIA FILE NO. 17-A

MFR: THE ALUMILINE CORP.

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SELF-INSULATING ALUMINUM SIDING

MFR'S DESCRIPTION: self-insulating aluminum siding called *Rexalum Imperial* developed.
USES: residential siding applications.
SPECS/FEATURES: described as thick fibrous glass blanket, backed with coated aluminum reflective insulation sheet which is factory-attached to panels. Features include: rapid installation; improved appearance; and resistance to rusting, warping and rotting. Said to be equivalent to 1" thick insulation board. Panels are 8" wide and 12' 6" in length; available in horizontal or vertical styles, in seven colors.
AIA FILE NO. 37-B
MFR: CONSOLIDATED GENERAL PRODUCTS, INC.
Circle 204 for further information

BUILT-IN STEREO INTERCOM SYSTEM

MFR'S DESCRIPTION: combination stereo-intercom system announced for installation in wall.
USES: residential applications.
SPECS/FEATURES: master controls can send AM or FM radio, high-fidelity record music, cartridge tape recordings or intercommunication features anywhere in house, mfr states. Features include: units built into wall, eliminating need for cabinets; walls themselves become speaker enclosures; installation ease; additional components may be added to system; use of intercom aspect automatically silences other components.
AIA FILE NO. 31-i
MFR: NUTONE, INC.
Circle 205 for further information

CHECKSTAND WITH REMOTE CASH DRAWER

MFR'S DESCRIPTION: *Super-Flow K-22A* checkstand, with accommodation for remote cash drawer and slant register, introduced.
USES: super market installations.
SPECS/FEATURES: unit is built on fully independent structural steel frame. Features provision of space for remote cash drawer at proper location and height for cashier sitting or standing. Two conveyor belts are intended to minimize handling and eliminate checking errors. Metal parts are treated for durability and rust resistance. Available in range of baked enamel finishes and choice of vinyl clad steel texture finishes.
AIA FILE NO. 35-H
MFR: SUPER MARKET EQUIPMENT DIV., HAPMAN CORP.
Circle 206 for further information

LIGHTWEIGHT PLASTIC ROOFING MATERIAL

MFR'S DESCRIPTION: lightweight plastic roofing, said to possess strength of steel and durability for lifetime of building, announced.
USES: flat and low-pitched residential and other type roofing.
SPECS/FEATURES: material may be applied on job or composed in prefabricated panels. Liquid plastic coating with quick hardener is applied on fibrous glass cloth stretched over sheeting board and covered with granules of selected color. Resultant roof weights about 45 lbs per square (100 sq ft,) according to mfr. Material is reportedly resistant to weather conditions, corrosion, erosion, oxidation and acids; is designed to flex with structure.
AIA FILE NO. 12-B
MFR: SHIELDCOAT INTERNATIONAL, INC.
Circle 207 for further information

CONVENTIONAL DIAL 24 HOUR CLOCKS

MFR'S DESCRIPTION: *Model 4003* introduced as first in series of conventional dial type 24 hour clocks.
USES: flush panel mounting in instrument board.
SPECS/FEATURES: described as easy to read, precision built, heavy duty clock. Case and mounting flange are black anodized aluminum; may also be furnished in gray or other colors. Main figures are ¼" high, white against black background. Dial face is 5" in diameter; overall depth of case is 3¾". Synchronous timing motors available are 50, 60, 400 and 500 cycle 100 volt ac.
AIA FILE NO. 35-N-4
MFR: HAYDON INSTRUMENT CO.
Circle 208 for further information

FIBROUS GLASS PIPE INSULATION

MFR'S DESCRIPTION: *Fit*Rite*, molded fibrous glass pipe-fitting insulation, now available in four thicknesses.
USES: standard pipe fittings.
SPECS/FEATURES: thicknesses are ½", 1", 1 ½" and 2"; available in standard sizes for welded and cast ells, tees and for special shapes. Supplied in two molded halves; can be installed with staples, soft wire or tape. Mfr claims greater thermal insulation per thickness than other insulating materials.
AIA FILE NO. 37-D
MFR: FIBROUS GLASS PRODUCTS, INC., SUBS., PALL CORP.
Circle 209 for further information

LOW-COST LIGHTNING ARRESTER

MFR'S DESCRIPTION: low-cost, 120/240 v lightning arrester introduced for protection against excessive voltage caused by lightning.
USES: homes, restaurants, motels, etc.
SPECS/FEATURES: mfr claims unit can be installed quickly and easily; requires no maintenance. Non-rusting aluminum hardware reported suitable for installation on side of house or hung from conduit adjacent to service lines.
AIA FILE NO. 31-D-8
MFR: GENERAL ELECTRIC
Circle 210 for further information

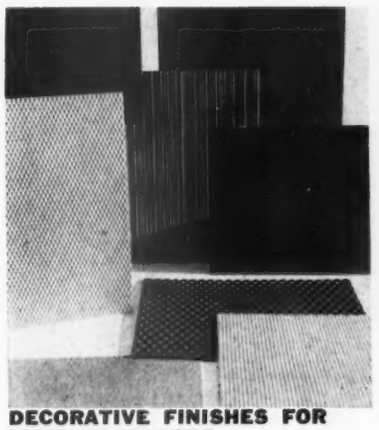
FOLDING PORTABLE CHORAL RISERS

MFR'S DESCRIPTION: *Model 4200* portable, folding choral risers developed.
USES: schools, public auditoria and similar institutional uses.
SPECS/FEATURES: mfr states units can be folded by one person and rolled to storage area 16½" by 54½". Are built to public grandstand safety codes; guaranteed for ten years. Available in 2, 3, or 4-rise units with unitized steel frameworks. When in use, risers rest on direct-to-floor load bearing columns. Platforms are 96" long and 18" wide; available heights are 8", 16", 25" and 32", with 8" rises.
AIA FILE NO. 35-A
MFR: SICO MFG. CO.
Circle 211 for further information

FINISHES/TREATMENTS

SOLID GOLD COATING FOR EXTERIORS

MFR'S DESCRIPTION: 23-karat gold solution available for coating exterior surfaces.
USES: coating porcelain enameled, stainless steel, ceramic tile, terra cotta, structural glass and other type panels.
SPECS/FEATURES: gold solution is applied to surface by any conventional method and then fired to eliminate all constituents of solution except gold. Final finish depends upon smoothness of original surface; finishes may be varied from matte to brilliant, according to mfr. Gold film is permanently fused to surface and will not peel or flake off, mfr states; is unaffected by chemical action of soaps, detergents and other cleaning solutions, excepting aqua regia. Also reported as resistant to fading and abrasion.
AIA FILE NO. 15-M
MFR: HANOVIA LIQUID GOLD DIV., ENGELHARD INDUSTRIES, INC.
Circle 212 for further information



DECORATIVE FINISHES FOR METAL SURFACES

MFR'S DESCRIPTION: system developed for spray application of decorative vinyl finishes.
USES: coating plain or textured metal.
SPECS/FEATURES: stated to be applicable to steel or aluminum after fabrication. Mfr claims finish can be sprayed on complex shapes and castings, in addition to flat surfaces. Features include corrosion resistance, toughness, resiliency, wide color

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AIA FILE NO. 24-B
MFR: METAL & THERMIT CO.
Circle 213 for further information

DURABLE PAINT FOR VARIED SURFACES

MFR'S DESCRIPTION: exterior-interior paint introduced for application on almost any surface; reported to last for five years.
USES: various decorative and protective applications.
SPECS/FEATURES: recommended for use on wood, brick, block, plaster, asbestos siding, stucco, tin, steel, iron, aluminum and other metals or asphalt shingles. Available in ten colors. May be applied by any conventional method, mfr states. Dries in about 20 minutes. Features include water and weather resistance, nonflammability and odorless quality.
AIA FILE NO. 25-C
MFR: ROX PRODUCTS CO.
Circle 214 for further information

LIQUID TREATMENT FOR CONCRETE FLOORS

MFR'S DESCRIPTION: *Dekote* is formulation developed as positive curing compound for newly poured concrete, which simultaneously hardens, seals and dustproofs.
USES: concrete floors.
SPECS/FEATURES: product is clear, ready-to-use, liquid solution said to be easily applied to fresh concrete using spray, roller or brush equipment. Mfr claims material need not be removed before application of secondary floor treatments; paints, tile or linoleum can be applied directly to surface after normal curing period. Meets ASTM Specification C-309-58T.
AIA FILE NO. 3-B
MFR: TRETOL, INC.
Circle 215 for further information

ANODIZING PROCESS FOR ALUMINUM

MFR'S DESCRIPTION: anodizing process introduced to create wide range of durable colors for architectural aluminum.
USES: aluminum for exterior applications.
SPECS/FEATURES: mfr reports *Kalcolor* process produces superior anodic coating with variety of colors and exceptionally high degree of color stability and uniformity. Colors result not from use of organic dyes, but through conversion of alloying elements within metal itself. Available colors include gold, amber, tan,

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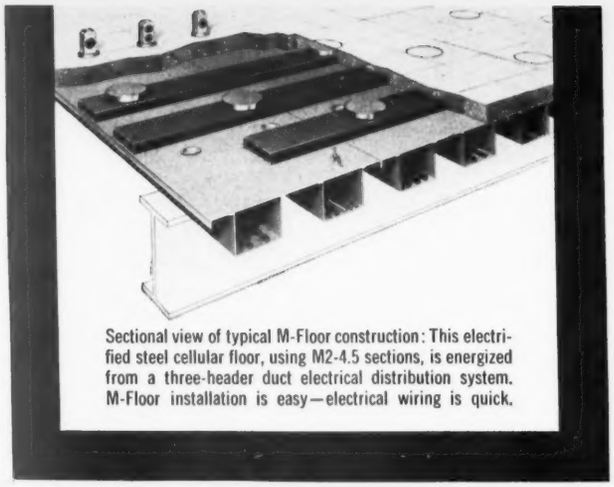
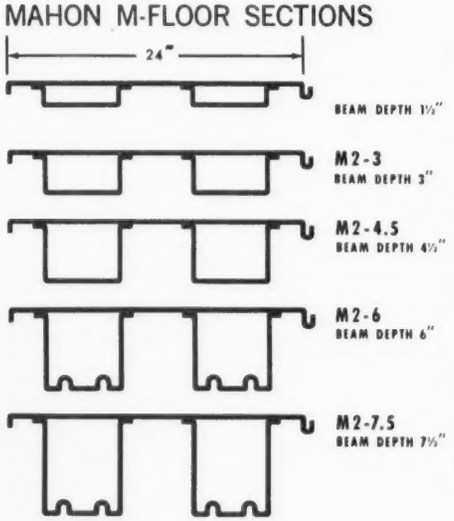


Sectional view of typical M-Floor construction: This electrified steel cellular floor, using M2-4.5 sections, is energized from a three-header duct electrical distribution system. M-Floor installation is easy—electrical wiring is quick.

Mahon M-Floors offer the architect and engineer economical structural advantages and easy electrical servicing of every square foot of floor space . . . give the client an ideal steel sub-floor and a raceway capacity that will not be outmoded by future electrical demands. Lightweight, high-strength steel cellular M-Floor sections are precision made by Mahon in various depths, gages and gage combinations to meet your design requirements . . . savings on foundations, installation time, construction convenience are dividends. Any type of floor covering can be used over the concrete fill . . . standard service fittings can be located wherever they are needed. To find out what versatile M-floors can do for you . . . your applications . . . your project costs . . . contact your local Mahon architectural representative, write for descriptive Catalog M-60 or see Sweet's Files.

MAHON M-FLOOR SECTIONS



MAHON BUILDING PRODUCTS

- Aluminum or Steel Curtain Wall (natural or colored metals)
- Rolling Steel Doors (Standard or Underwriters' labeled)
- Metalclad Fire Walls (Underwriters' rated)
- M-Floors (Steel Cellular Sub-Floors)
- Long Span M-Deck (Cellular or Open Beam)
- Steel Roof Deck
- Acoustical and Troffer Forms
- Acoustical Metal Walls, Partitions, and Roof Deck
- Permanent Concrete Floor Forms

CONSTRUCTION SERVICES

- Structural Steel—Fabrication and Erection
- Steel Fabrication—Weldments

THE R. C. MAHON COMPANY
Detroit 34, Michigan

Manufacturing Plants—Detroit, Michigan and Los Angeles, California
Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco
Representatives in all principal cities.

SPEEDING AMERICAN CONSTRUCTION WITH METAL BUILDING PRODUCTS, FABRICATED EQUIPMENT AND ERECTION SERVICES.

M A H O N

Circle 123 for further information

brown, olive, gray and black. Successfully tested for four year period, under ASTM procedures, for fading, corrosion and abrasion.
AIA FILE NO. 25-C-3
MFR: KAISER ALUMINUM & CHEMICAL SALES, INC.
Circle 216 for further information

FLAME RETARDANT COPPER-CLAD LAMINATE

MFR'S DESCRIPTION: copper-clad, hot-punch, paper-base, fire retardant phenolic laminate introduced.
USES: fire retarding applications.
SPECS/FEATURES: called *Fireban 321-R* or *Fireban 321-E*, depending upon whether copper coil is rolled or electrolytically deposited. Meets UL requirements for flame retardance. Mfr claims material possesses excellent punching and electrical characteristics, including high insulation resistance and surface resistivity in base stock. Offered in sheets of approximately 36" x 48", in thicknesses from .020" to ¼".
AIA FILE NO. 24
MFR: TAYLOR FIBRE CO.
Circle 217 for further information

ALUMINUM COATING IN REDUCED TIME

MFR'S DESCRIPTION: process for anodizing or hard-coating aluminum parts developed, reported to be ten to fifty times faster than conventional methods.
USES: aluminum for architectural components.
SPECS/FEATURES: mfr claims such features as abrasion resistance, greater electrical efficiency, reduced refrigeration requirements and lighter color of the end product. Time reduction aspect results from use of very high current densities in process, mfr states. Coatings range from a silver gray to medium gray, making wider range of colors possible.
AIA FILE NO. 15-M
MFR: TORO MFG. CORP.
Circle 218 for further information

OIL-FREE CLEANER FOR BUILDING SURFACES

MFR'S DESCRIPTION: *Weatherban Brand Cleaner* is oil-free, high solvency cleaner designed for cleaning of metal, glass and masonry building surfaces.
USES: cleaning curtain wall and similar type buildings prior to application of maintenance sealers.
SPECS/FEATURES: intended for cleaning prior to maintenance and other two-part liquid polysulphide type

sealer applications. Also designed for fast, easy removal of wet polysulphide sealers and priming agents from building surfaces and applicator tools, according to mfr. Reported to dissolve oil, dirt, grease, asphalts, coal tar and other contaminants.
AIA FILE NO. 17-G
MFR: ADHESIVES AND COATINGS DIV., MINNESOTA MINING AND MFG. CO.
Circle 219 for further information

METAL UNITS

STEEL JOIST HAS ADDED LENGTH

MFR'S DESCRIPTION: *T-Chord Longspan* joist now available; length is 175'.
USES: shopping centers, warehouses, etc.
SPECS/FEATURES: designed to be used in structures requiring column-free floor areas of maximum width, according to mfr. Unit meets AISC specifications. Features include: web members designed for compression stresses; T-Chord construction; one-piece fabrication with matched fit splices; and ASTM-A-7 steel with minimum thickness of 3/16".
AIA FILE NO. 13-G
MFR: HAVEN-BUSCH CO.
Circle 220 for further information

JOIST HANGER LINE EXPANDED

MFR'S DESCRIPTION: *Type 24 Teco-U-Grip* joist hanger added to line of framing devices.
USES: with 2 x 4 members in framing of light ceiling and roof joists, carports, etc.
SPECS/FEATURES: made of 18 gauge, corrosion resistant steel, unit is 3¼" high with joist seat measuring 3⅝" in width and 1½" in depth. Special nails, 1¼" long, are furnished.
AIA FILE NO. 14-J
MFR: TIMBER ENGINEERING CO.
Circle 221 for further information

ADJUSTABLE FITTINGS LINE INCREASED

MFR'S DESCRIPTION: four additions made to *Speed-Rail* line of adjustable fittings.
USES: angle railing construction.
SPECS/FEATURES: items are cross, stair landing tee, side outlet ell or tee and double side outlet ell or tee, all adjustable. Units are of high tensile non-corrosive aluminum alloy; swivel 180° for use with stairway railings and angled braces and supports.
AIA FILE NO. 14-D-4
MFR: THE HOLLAENDER MFG. CO.
Circle 222 for further information

High-styled, one-piece chassis CORBIN UNIT LOCKS, with their versatile Master Ring Cylinders, fit right in with Corbin's New Construction Masterkey System!

Circle 124 for further information

NEW CONSTRUCTION MASTERKEY SYSTEM by CORBIN

No need for the costly procedure of resetting cylinders . . . Corbin's come up with the simplest answer–a new Construction Masterkey system!

Just put the Owner's Key into the same Corbin Lock that everybody used all through construction. Turn it once, and presto! you have an *entirely new lock system.*

Forget about resetting lock cylinders. Forget about collecting construction keys, they're entirely obsolete. The Owner's Key has done it all–automatically! From now on, only Master, change and regular keys will work.

Here you have a tremendous advantage: time-saving, trouble-saving, cost-saving simplicity. Plus Corbin security–all in "one package"–another example of Corbin superiority! **It pays to make it Corbin–throughout!**

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P. & F. CORBIN DIVISION
THE AMERICAN HARDWARE CORPORATION
NEW BRITAIN, CONNECTICUT

Circle 124 for further information

PRODUCTS, EQUIPMENT, MATERIALS

ANODIZED ALUMINUM CLOSET ROD

MFR'S DESCRIPTION: *Golden Closet Rod* available in gold anodized aluminum.
USES: residential applications.
SPECS/FEATURES: reported to be easily installed in any type of closet. Includes black nylon carriers which snap into track; additional carriers may be added. Available in nine standard closet sizes from 3′ to 8′. Offered in complete packages including rod, track, carriers, end brackets, center supports and screws.
AIA FILE NO. 35-N-22
MFR: GRANT PULLEY & HARDWARE CORP.
Circle 223 for further information

FLEXIBLE STEEL FORM FOR CONCRETE

MFR'S DESCRIPTION: *Radi-Lok* is flexible steel form for pouring uniform curves in concrete.
USES: concrete construction.
SPECS/FEATURES: mfr states forms can be pre-set to hold any desired contour. Said to shorten set-up time, minimize stripping effort and practically eliminate surface finishing. Lightweight units available in 10′ lengths, in heights ranging from 4″ to 24″; may be joined in series to compose variety of contours.
AIA FILE NO. 4-D-21
MFR: BINGHAMTON METAL FORMS, INC.
Circle 224 for further information

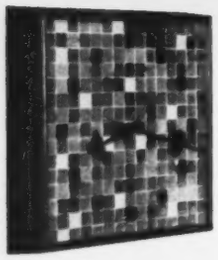
FLOOR APPLICATIONS

VINYL CARPETING WITH CUSHIONING

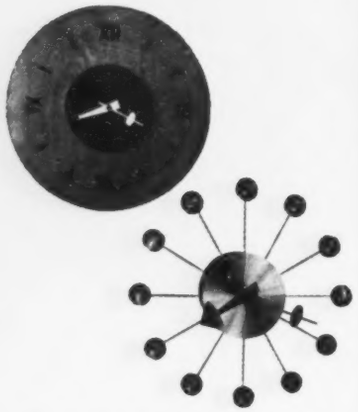
MFR'S DESCRIPTION: all vinyl carpeting and stair covering announced, with special cushion back to give feeling of softness and thickness underfoot.
USES: stairs, landings, halls, entranceways, etc.
SPECS/FEATURES: available in two textured patterns and six colors. Said to be readily cleaned and durable. Cushioned backing holds firmly to floors and stairs to help avoid slips and falls, according to mfr.
AIA FILE NO. 28-E
MFR: AMTICO FLOORING DIV., AMERICAN BILTRITE RUBBER CO.
Circle 225 for further information

RUBBER FLOORING LINE EXPANDED

MFR'S DESCRIPTION: seven colors added to rubber flooring line.
USES: flooring installations.
SPECS/FEATURES: four colors added to *Flexi-Flor* (marbleized) line are



NOW DECORATOR CLOCKS AS PART OF HONEYWELL'S CLOCKMASTER SYSTEM



For the first time, you can specify a dependable clock system that matches each interior theme Each provides the finest in supervised time—a complete clock-slave system with programming optional. And regardless of your choice, each clock is backed by traditionally fine Honeywell service.

75th YEAR — Leading the Future

Honeywell

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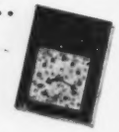

FREE Full-color, 8-page booklet describes and illustrates 33 attractive new Decorator Clocks, one just right for the theme you have in mind.
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*Address*_____

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Circle 125 for further information

medium tan, medium blue, gray beige and charcoal gray. *Tara-Flor* (terrazzo design) now available in coral, rust and medium tan, in addition to standard colors.
AIA FILE NO. 23-G
MFR: THE R. C. A. RUBBER CO.
Circle 226 for further information

CONCRETE FLOOR REDUCES MAINTENANCE

MFR'S DESCRIPTION: concrete floor developed to kill bacteria and fungus and reduce maintenance and repair expenses.
USES: hospitals and food handling areas.
SPECS/FEATURES: said to be capable of aiding hospital control of Staphlococcus Aureus. Bactericidal agent is insoluble; retains efficiency for life of floor, according to mfr.
AIA FILE NO. 10-C
MFR: KALMAN FLOOR CO.
Circle 227 for further information

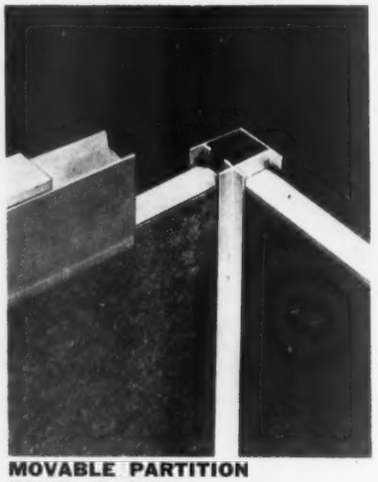
PARTITIONS/MOVABLE WALLS

CERAMIC WALL CONSTRUCTION SYSTEM

MFR'S DESCRIPTION: *Thrift-Wall* system announced as low-cost wall construction system.
USES: interior walls.
SPECS/FEATURES: system utilizes three basic structural ceramic units and standard, pre-engineered, metal "surround" frames. Is adaptable to structural glazed tile with standard face dimensions of 8" x 16", 5 1/3" x 12" and 5 1/3" x 8". Any wall detailed in 8" increments, can be constructed by using standard structural tile stretchers, corners and stretcher finished two sides. Mfr states system can reduce total structural ceramic tile wall costs by at least 35 per cent.
AIA FILE NO. 10-B
MFR: STARK CERAMICS, INC.
Circle 228 for further information

MOVABLE METAL WALL SYSTEMS

MFR'S DESCRIPTION: *Signature* and *Delineator* movable wall systems, designed to achieve minimum wall thickness with maximum function, announced.
USES: commercial, industrial, office and allied installations.
SPECS/FEATURES: systems feature metal walls said to be both slim and functional. *Signature* is designed for commercial and industrial uses; features include trim appearance, improved sound control, flexibility and access to wiring. *Delineator* is intended to provide architects maximum design freedom with mass produced materials. Panels are available on 4" module from 2' to 5' in width. Designed to make possible use of variety of covering materials, including natural woods, vinyls, silks, etc.
AIA FILE NO. 35-H-6
MFR: E. F. HAUSERMAN CO.
Circle 229 for further information



MOVABLE PARTITION PANEL SYSTEMS

MFR'S DESCRIPTION: line of partition panels for movable partitions systems introduced.
USES: numerous movable systems.
SPECS/FEATURES: offered with birch, mahogany and tempered hardboard surfaced panels, in six thicknesses from 1 3/8" to 2 3/4". Kerfed panels also available with centerline kerf 1/4" wide and 13/16" deep to accommodate 1/4" thick by 1 1/2" wide spline.
AIA FILE NO. 35-H-6
MFR: SIMPSON LOGGING CO.
Circle 230 for further information

PRE-FABRICATED METAL WALL PANEL

MFR'S DESCRIPTION: acoustically treated, pre-fabricated, flush type metal wall panel offered.
USES: interior dividing wall or partition in areas requiring noise reduction.
SPECS/FEATURES: panel is perforated on one side and has sound absorbing element of fibrous glass between two metal surfaces. Available in 2' wide sections in 2" or 3" thicknesses with choice of galvanized or cold rolled steel, primed with baked synthetic enamel. Noise reduction coefficient of .90 claimed for 3" panel; .70 for 2" type.
AIA FILE NO. 39-B
MFR: BUILDING PRODUCTS DIV., THE R. C. MAHON CO.
Circle 231 for further information

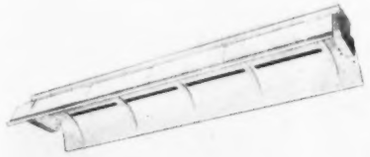
LIGHTING

DECORATIVE FIXTURES FOR EXTERIORS

MFR'S DESCRIPTION: *Model 421* added to *Imperialite* line of outdoor lighting fixtures.
USES: decorative exterior uses.
SPECS/FEATURES: model is black and brass aluminum post lantern, 11 1/2" high with 21" spread; fits standard 3" post. Opal glass with 150-watt lamp. Line consists of variety of colonial and modern type post lanterns in frosted, clear or textured crystal glass.
AIA FILE NO. 31-F-22
MFR: THE EMERSON ELECTRIC MFG. CO.
Circle 232 for further information

VAPORTIGHT INDUSTRIAL LIGHTING FIXTURES

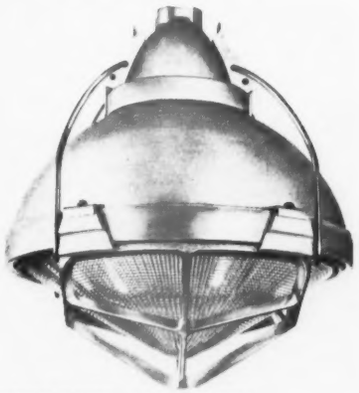
MFR'S DESCRIPTION: die cast aluminum line of vaportight industrial lighting fixtures announced.
USES: industrial areas.
SPECS/FEATURES: coating on unit said to afford protection of metal parts from corrosive effects of salt spray, acid fumes, strong caustics and organic liquids. Available in 100 watt and 200 watt sizes with or without reflectors of dome, shallow bowl, deep bowl and angle types. Are UL approved.
AIA FILE NO. 31-F-28
MFR: THE PYLE-NATIONAL CO.
Circle 233 for further information



CONTOURED REFLECTOR FLUORESCENT LUMINAIRE

MFR'S DESCRIPTION: *Mark V Industrolux*, contoured reflector luminaire, is recently introduced industrial fluorescent lighting fixture.
USES: industrial locations.
SPECS/FEATURES: reflector is of ribbed construction; has five heavy dieformed ribs every 48". May be hung

in continuous rows or individually. Selection of mounting accessories available. Has white porcelain finish; reflectance is over 85 per cent, according to mfr.
AIA FILE NO. 31-F-23
MFR: SMOOT-HOLMAN CO.
Circle 234 for further information



ENCLOSED, GASKETED INDUSTRIAL LUMINAIRE

MFR'S DESCRIPTION: *no. 02444* unit is heavy duty, enclosed and gasketed industrial luminaire for both indoor and outdoor applications.
USES: such industrial applications as chemical plants, food processing plants, paper mills, generating stations, warehouses, etc.
SPECS FEATURES: prismatic control of light said to provide widespread distribution pattern and high utilization efficiency. Unit is fabricated of cast aluminum for rough conditions. Other features include weather and corrosion resistance, low maintenance cost and simple installation. Listed by UL.
AIA FILE NO. 31-F-22
MFR: HOLOPHANE CO., INC.
Circle 235 for further information

FLUORESCENT FIXTURE FOR EXTERIORS

MFR'S DESCRIPTION: *Type HLG* is weatherproof, efficient fluorescent fixture designed for outdoor installation as well as some indoor applications.
USES: tunnels, underpasses, loading docks, etc.
SPECS FEATURES: mfr describes fixture as of sturdy construction with shatterproof plastic lens. Housing is extruded aluminum with cast aluminum end caps. Alloys are corrosion resistant and joints are gasketed, according to mfr.
AIA FILE NO. 31-F-22
MFR: CROUSE-HINDS CO.
Circle 236 for further information

ECONOMICAL MERCURY CONVERSION KIT

MFR'S DESCRIPTION: mercury conversion kit offered to facilitate change-

Here's the really low-cost insulating roof deck system!

- LIGHTWEIGHT
- FIRESAFE
- PERMANENT

Zonolite® Insulating Concrete

Over galvanized steel decks... saves time, labor, money!

Job Reports Reveal Thousands of Dollars Saved when a Zonolite system is specified over alternate proposals!

Selecting a Zonolite roof deck system is a sure way to solve immediate budgeting problems. Case histories prove this. One recent job report showed a $38,000 saving with Zonolite, when compared with an alternate proposal!

Zonolite offers you practical assistance with its nationwide network of concrete specialists and experienced roof deck applicators

When designing roof decks, architects confidently specify Zonolite vermiculite concrete. For nowhere in the building industry is there found an equal to Zonolite systems of lightweight roof construction. They are speedy to erect, monolithic, firesafe, insulating. Yet in spite of these important beneficial features, *they are low in cost and cut maintenance.* Zonolite roof decks—adaptable to any design—have good appearance. The system of construction shown here is just one of many combinations made possible by using Zonolite vermiculite concrete. For details of the many roof deck systems, mail coupon—no obligation.

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INSULATING CONCRETE

MAIL COUPON FOR COMPLETE DATA FILE AND INFORMATION—*NO OBLIGATION*

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Please send me your new booklet CA-50 on firesafe insulating roof systems.

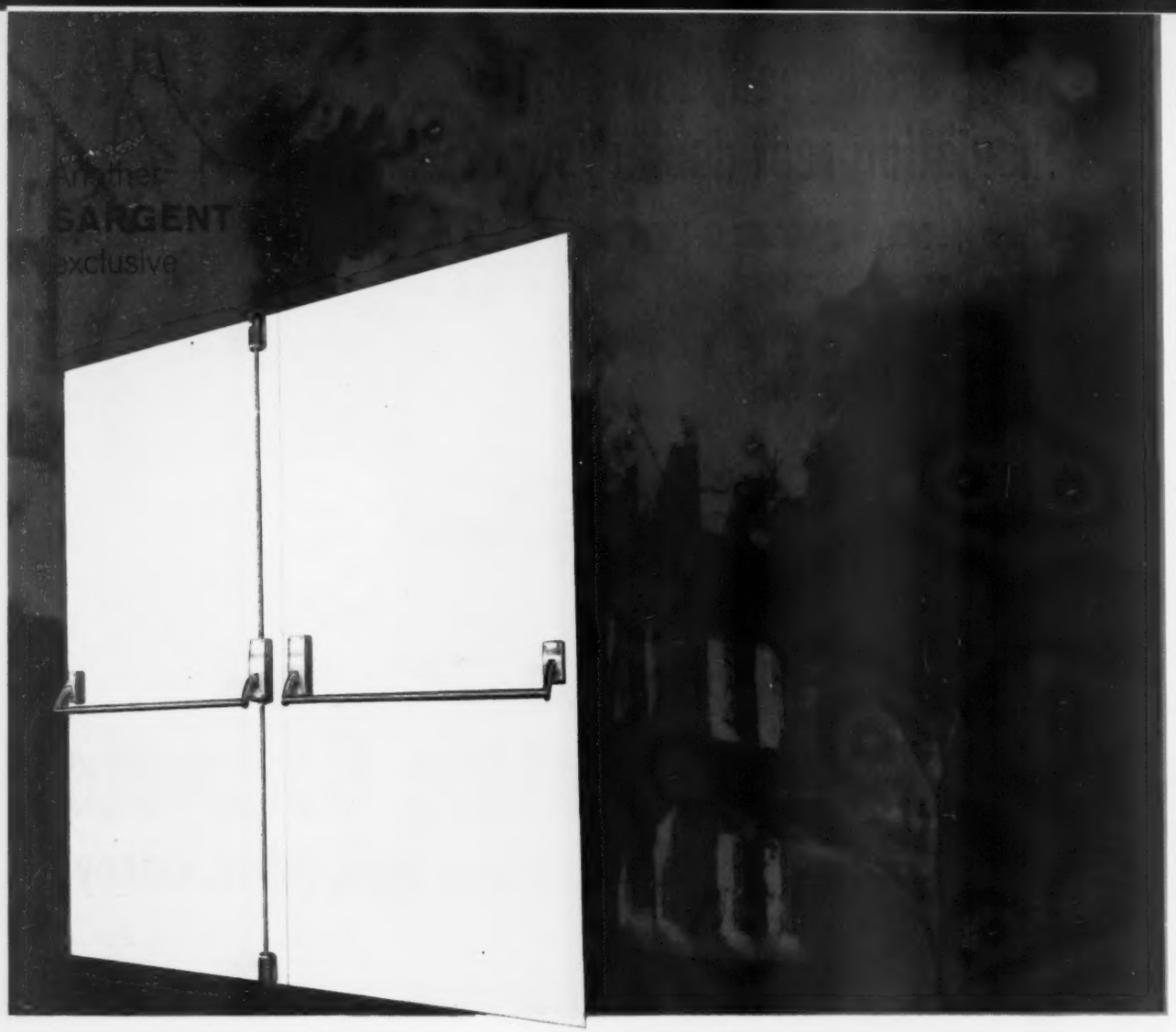
Name_____

Firm Name_____

Address_____

City_____ Zone_____ State_____

Circle 126 for further information



The only line of exit devices U.L. approved for both fire and panic!

The Sargent line of Standard Exit Devices is the only one offered by any manufacturer, at any price, that is approved by the Underwriters' Laboratories for "Panic" and has successfully passed the U. L. 3 hour fire test.* Now you can protect both life and property with U.L. approved Exit Bolts on either SINGLE OR PAIRS OF DOORS. See your Sargent Supplier or write Sargent & Company, New Haven 9, Connecticut.

** Tested with doors by Overly Manufacturing Company*

SARGENT

THE NEWEST FASHION IN A COMPLETE LINE OF ARCHITECTURAL HARDWARE

PRODUCTS, EQUIPMENT, MATERIALS

over from incandescent to mercury vapor lighting.

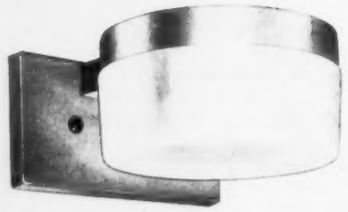
USES: conversion of EEI-NEMA street lighting heads from incandescent service to mercury vapor lighting.

SPECS/FEATURES: available for 100, 175, 250 and 400 watt lamps operating on line voltages of 240 volts; consists of unitized package which includes lamp socket, reflector plate, choke-reactor and anodized mounting bracket. Reported to facilitate changeover in one operation at minimal cost. Furnished with six terminal sockets for use with photo cells.

AIA FILE NO. 31-F-2

MFR: SYLVANIA ELECTRIC PRODUCTS, INC., SUBS., GENERAL TELEPHONE & ELECTRONICS CORP.

Circle 237 for further information



ALUMINUM WALL BRACKET FIXTURE

MFR'S DESCRIPTION: diecast aluminum wall bracket lighting fixture now available.

USES: halls, porches, under overhangs, soffits, etc.

SPECS/FEATURES: made of hand blown, hinged enclosing glass, 8" in diameter. Available in variety of finishes, including satin chrome and oyster, brown, green, black or synthetic satin brass baked enamel.

AIA FILE NO. 31-F-23

MFR: PRESCOLITE MFG. CORP.

Circle 238 for further information

PLUMBING ACCESSORIES

SHOWER UNIT HAS ADJUSTABLE HEIGHT

MFR'S DESCRIPTION: *Vari-Height* shower unit offered; can be adjusted vertically.

USES: residential installations.

SPECS/FEATURES: unit consists of rectangular, chrome-plated brass body, 24" long x 3¾" wide x 1⅝" deep, upon which sliding shower head is mounted. Nozzle is not in-

← Circle 127 for further information

cluded. Two models available, for flush mounting and for wall attachment.
AIA FILE NO. 29-H-3
MFR: BICKFORD MFG. CO.
Circle 239 for further information

WALL-MOUNTED WATER COOLERS

MFR'S DESCRIPTION: two water coolers introduced for wall mounting.
USES: various applications.
SPECS/FEATURES: models *WL7D*, with capacity of 7 gals per hour, and *WL11D*, with capacity of 11 gals per hour, said to be suitable for flush mounting on wall, with all plumbing concealed. Units have fan cooled, finned tube condensers; bubblers are hand actuated.
AIA FILE NO. 29-D-42
MFR: WESTINGHOUSE ELECTRIC CORP.
Circle 240 for further information

MULTI-STATION SHOWER FIXTURES

MFR'S DESCRIPTION: *Showergon*, central shower system, added to *Space'anea* line of multiple shower fixtures.
USES: schools, colleges and other institutional and industrial uses.
SPECS/FEATURES: system available in units of one to six stations; wall mounted models available in one, two or three shower stations. Basic stainless steel unit embodies concealed piping, choice of hot and cold water compression valves, tempered water valve or no valve and optional lather type soap dispensing system.
AIA FILE NO. 29-H-3
MFR: THE LOGAN MFG. CO.
Circle 241 for further information

WATER COOLERS FOR SERVICING EASE

MFR'S DESCRIPTION: line of water coolers offered with *Packaged Cooling* concept designed to eliminate major field service.
USES: commercial, institutional and industrial installations.
SPECS/FEATURES: cooling concept refers to separate inside cabinet which houses entire refrigeration system. Cabinet is self-contained unit, 12$^{9}/_{16}$" x 20", to permit convenient installation and easy removal for replacement or service. Coolers are wall-hung and remote type, furnished in various capacities.
AIA FILE NO. 29-D-42
MFR: SUNROC CORP.
Circle 242 for further information

HARDWARE

STAINLESS STEEL DOOR HARDWARE

MFR'S DESCRIPTION: hardware for patient room door control offered in stainless steel.
USES: hospital patient rooms.
SPECS/FEATURES: door control combination includes overhead friction door holder, two combination hand and arm pulls, roller latch and rubber door silencers. Parts are of durable, non-porous stainless steel, impervious to tarnish, corrosion and rust, according to mfr.
AIA FILE NO. 27-B
MFR: GLYNN-JOHNSON CORP.
Circle 243 for further information

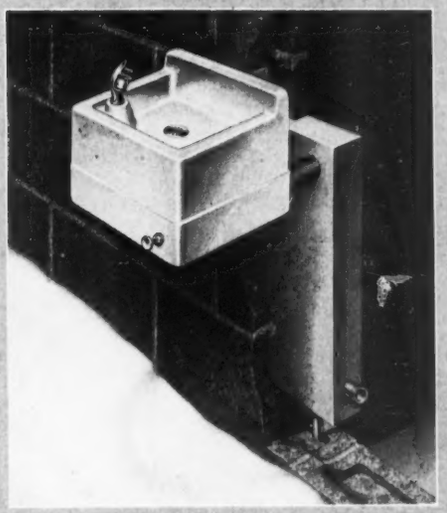
HARDWARE LINE EXPANDED

MFR'S DESCRIPTION: four items added to cabinet hardware line.
USES: varied cabinet applications.
SPECS/FEATURES: additional items are: contoured zinc die cast knob; zinc die cast pull; triangular backplate; and decorative square backplate. Backplates are wrought steel, brass or bronze; all items available in variety of finishes.
AIA FILE NO. 27-B
MFR: MEDALIST SALES DIV., NATIONAL LOCK CO.
Circle 244 for further information

STEEL HINGE ELIMINATES MORTISING

MFR'S DESCRIPTION: heavy duty *No-Mortise Fastinge* offered to eliminate time consuming mortising.
USES: all types of doors.
SPECS/FEATURES: FHA approved unit reported to save time on installation of any type door. Door is placed in position against jamb; unit is then positioned and screw holes are indicated; pin is removed from hinge, hinge flaps are screwed to door and jamb; and door is repositioned, hinge knuckles are meshed and pin is inserted. Available in four sizes, in heavy-duty 14-gage prime steel.
AIA FILE NO. 27-B
MFR: EDWARD LEEDS & CO.
Circle 245 for further information

FREEZE-PROOF



HAWS Free Flowing Fountain Service in *any* Climate!

For positive Winter Protection against costly "freeze-ups" and excessive maintenance of outdoor fountains ...specify HAWS Freeze-Proof Units! Get year 'round drinking service. The choice of style is yours! Freeze-Proof Units are available with virtually any style fountain from HAWS' complete line—wall or pedestal, single or multiple bubbler. For details on model selection and installation ... see SWEETS Architectural File, or write today for catalog.

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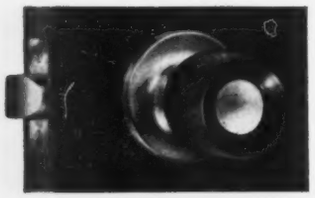
Export Dept.: 19 Columbus Ave. • San Francisco 11, California
Circle 128 for further information

exotic wood knobs for interiors...

by russwin

Russwin Stilemaker Doorware with wood knobs of rich, rare cocobolo, rosewood, walnut and ebony. These distinctive colorful knobs enhance any interior decor and are extremely durable.

Stilemaker heavy-duty doorware is constructed for long, trouble-free service. For details on complete line, write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.



RUSSWIN

Circle 129 for further information

In... schools colleges theatres arenas auditoriums

for Planned Spotlight Installations

Specification sheets and descriptive brochures on the entire line of—

Strong INCANDESCENT AND CARBON ARC FOLLOW SPOTLIGHTS

have been prepared and are now available for architectural use.

Foot candle readings and diameters for spots of all sizes at various lengths of throws are included.

Strong — A GENERAL PRECISION COMPANY

For free copies write—

THE STRONG ELECTRIC CORP.

340 City Park Avenue • Toledo 1, Ohio

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

Circle 130 for further information

PRODUCTS, EQUIPMENT, MATERIALS

HVAC

HEAT-OPERATED ABSORPTION REFRIGERATION UNITS

MFR'S DESCRIPTION: wider selection of heat-operated absorption refrigerating machines with control system for reduction of operating costs, announced.

USES: cooling applications.

SPECS/FEATURES: models available in 20 sizes ranging in capacity from 50 to 1,000 tons. Solution valve control system is incorporated in units, said to offer substantial saving through lower steam consumption when operating at partial capacity.

AIA FILE NO. 30-F

MFR: CARRIER CORP.

Circle 246 for further information

UNIT HEATERS FOR MULTI-STORY BUILDINGS

MFR'S DESCRIPTION: motorized vent exhauster developed as aid to gas unit heating.

USES: office buildings, manufacturing plants and multi-story warehouses.

SPECS/FEATURES: unit vents exhaust gases from unit heaters directly to outdoors through side wall of building. Requires only a short length of standard, lightweight 4" pipe, according to mfr. Units, powered by permanently lubricated, fan-cooled electric motor and thermostat controlled, are said to be half the size and price of similar capacity units.

AIA FILE NO. 30-B-6

MFR: REZNOR MFG. CO.

Circle 247 for further information

GAS-FIRED FURNACE LINE

MFR'S DESCRIPTION: gas-fired furnace line includes *Gravity, Counterflow, Lo-Boy* and *Hi-Boy* models to provide greater heat transfer.

USES: heating applications.

SPECS/FEATURES: controls and wiring are confined within jacket. Removable front panel permits easy access for service, according to mfr. Primary heat exchanger incorporates two heat baffles. All units designed for operation on manufactured, mixed and natural gases.

AIA FILE NO. 30-B

MFR: THE PEERLESS HEATER CO.

Circle 248 for further information

ELECTRIC FURNACE FOR SUMMER AND WINTER

MFR'S DESCRIPTION: *Type 319* electric furnace developed for year 'round control of home climate regardless of fuel.

USES: residential unit.

PLANK *in luxurious new Trendwoods® for wash-and-wear walls anywhere*

You'll get faster completions, more beautiful results with new Marlite Random Plank. The 16" wide by 8' long planks (¼" thick) are tongued and grooved for easy installation over furring strips or existing walls. Ready to use without painting or further protection, plastic-finished Marlite resists stains, mars, dents — cleans with a damp cloth. See your building materials dealer, or write Marlite Division of Masonite Corporation, Dept. 466, Dover, Ohio.

FREE! Send for colorful catalog

Marlite®

plastic-finished paneling

6039

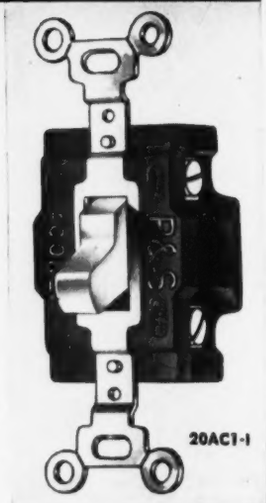
MARLITE IS ANOTHER QUALITY PRODUCT OF MASONITE® RESEARCH

Circle 131 for further information

SPECIFIED FOR RUGGED DUTY

P&S

SUPER AC SWITCHES



- Extra large terminal screws.
- Extra large silver buttons.
- Can be used to *full rated capacity* on inductive loads.
- Contacts in upright position mounted at point of least vibration.
- Available in 15 and 20 Amp. types.

Send for complete catalog, Dept. AE-46

P&S **PASS & SEYMOUR, INC.**

SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill. In Canada: Renfrew Electric Co., Ltd., Toronto, Ontario

Circle 132 for further information

SPECS/FEATURES: unit features provision for fast and economical adaption to summer cooling, according to mfr. Available in 81,840 btu/hr output. Can be adapted to central air-conditioning by placing cooling coil directly into casing, without changing furnace or plenum arrangement. Centrifugal type remote condenser can be used as part of cooling system, mfr states.
AIA FILE NO. 31-K-2
MFR: MUELLER CLIMATROL DIV., WORTHINGTON CORP.
Circle 249 for further information

DOORS/WINDOWS

PREFINISHED DOORS IN MULTIPLE UNITS

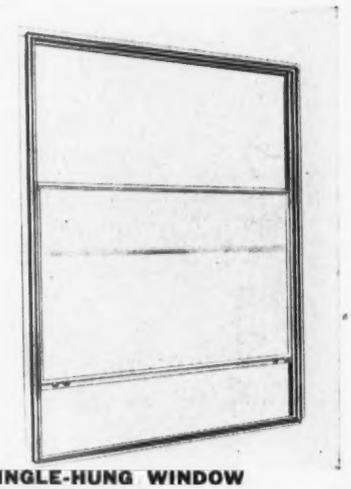
MFR'S DESCRIPTION: *Weldwood Mono-Fin* door announced, for shipping to site in prefinished, multiple units.
USES: ceiling-high, passage closet and cabinet doors.
SPECS/FEATURES: doors consist of two 8' high 7/16" hardwood plywood skins, bonded at outside long edges. Are shipped to site flat in multiple units, completely prefinished; door is opened by insertion of 8' long parting member after cutting to size.
AIA FILE NO. 19-E-1
MFR: UNITED STATES PLYWOOD CORP.
Circle 250 for further information

EXTRUDED ALUMINUM DOOR TRACK

MFR'S DESCRIPTION: *Flange Mounted Track*, extruded aluminum, one-piece double track for by-passing 3/4" to 1 3/4" doors, announced.
USES: by-passing door units.
SPECS/FEATURES: stated to eliminate need for finished head jamb, fascia strip and cutting of doors. Designed to permit installation of by-passing doors with same rough opening height and same casing used for hinged doors.
AIA FILE NO. 16-C
MFR: JOHN STERLING CORP.
Circle 251 for further information

ALUMINUM/STAINLESS STEEL DOOR LINE

MFR'S DESCRIPTION: door line comprises four aluminum units and one stainless steel door, varying from slim to massive models.
USES: commercial and institutional uses.
SPECS/FEATURES: offered as entrance packages, including door, frame and closer, all integral parts. Models are: *Narrow Stile "188,"* for normal traffic situations such as stores and small to medium size buildings; *Style Leader "125,"* with thin line stiles and center hung styling; *Extra Duty "350,"* for heavy, abusive traffic of schools and institutions; *Wide Stile "500,"* for monumental type buildings—mfr claims unit is strongest aluminum door currently available; and *Stainless Steel "200,"* available with manual or automatic closer completely concealed in transom bar—designed for banks, office buildings, etc.
AIA FILE NO. 16-A
MFR: KAWNEER CO.
Circle 252 for further information



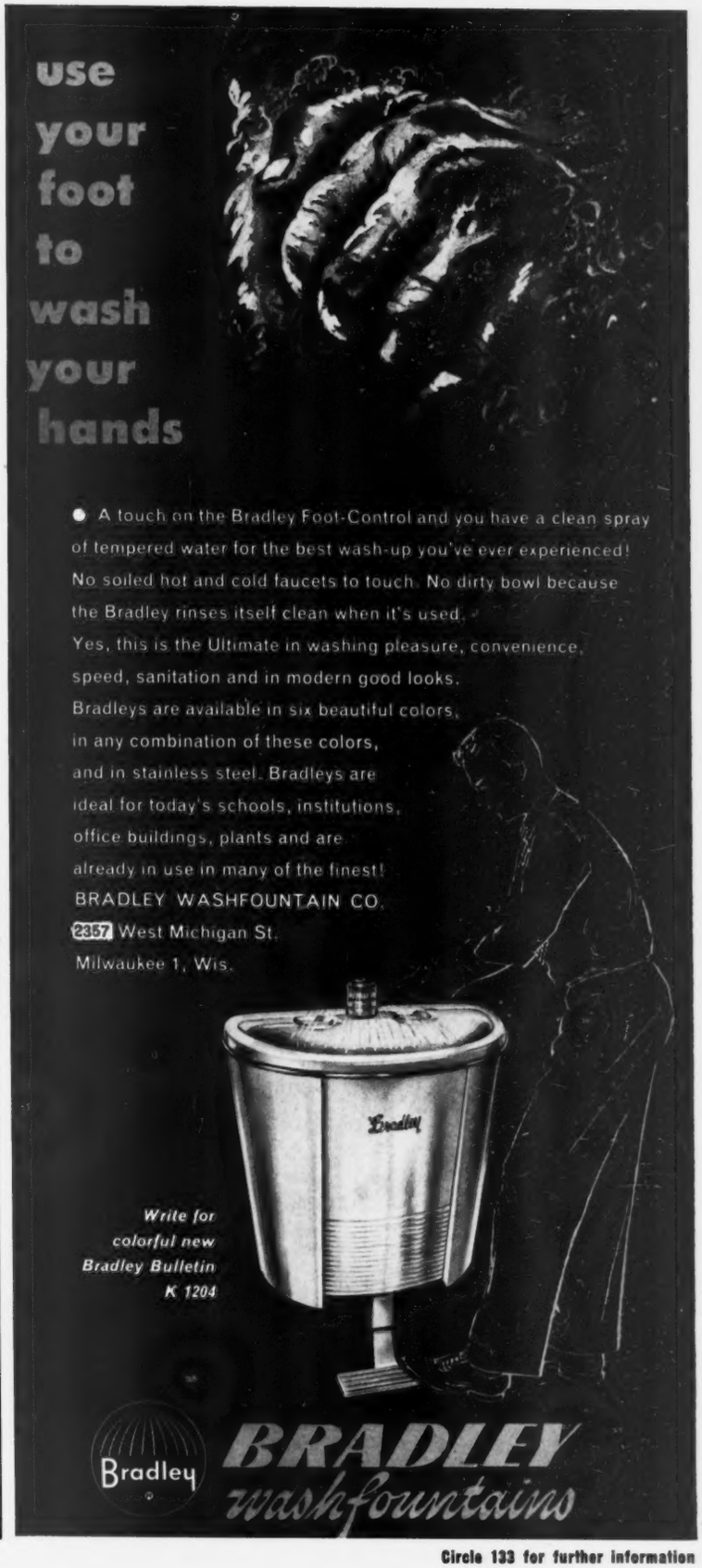
SINGLE-HUNG WINDOW OF ALUMINUM

MFR'S DESCRIPTION: *Series 160*, aluminum single-hung window, announced.
USES: residential and light construction applications.
SPECS/FEATURES: features combination spring-loaded locks and lift handles. Ventilator openings have wool pile weatherstripping around entire perimeter. Still is double weather-stripped. Fabricated of aluminum alloy extrusions, units are available glazed, in wide range of sizes, with or without horizontal muntin bars.
AIA FILE NO. 16-E
MFR: TRUSCON DIV., REPUBLIC STEEL CORP.
Circle 253 for further information

OFFICE AIDS

UNIT FOR ART WORK PREPARATION

MFR'S DESCRIPTION: *Lightning Desk Trimmer* offered, designed to eliminate scissors and razor blades for cutting and trimming photographs and art preparation materials.
USES: desk unit for drafting offices.
SPECS/FEATURES: exposed parts are nickel plated; base and table frame are of welded tubular steel with angle bars to prevent warping. Top and bottom knives are high-grade, hardened *Solingen* steel. Three sizes


use your foot to wash your hands
● A touch on the Bradley Foot-Control and you have a clean spray of tempered water for the best wash-up you've ever experienced! No soiled hot and cold faucets to touch. No dirty bowl because the Bradley rinses itself clean when it's used.
Yes, this is the Ultimate in washing pleasure, convenience, speed, sanitation and in modern good looks.
Bradleys are available in six beautiful colors, in any combination of these colors, and in stainless steel. Bradleys are ideal for today's schools, institutions, office buildings, plants and are already in use in many of the finest!
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Write for colorful new Bradley Bulletin K 1204
Bradley
BRADLEY washfountains
Circle 133 for further information

classic designs in metals...

by russwin

The Russwin Jet Design Stilemaker — A heavy-duty cylindrical lockset beautifully proportioned in brass, bronze, or aluminum . . . all standard finishes. Abuse-proof Russwin construction, with heavy steel chassis and phosphor bronze springs. Distinctive . . . dependable. For details on complete line, write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.

RUSSWIN

Circle 134 for further information

Leading Architects tell us:

MIDGET LOUVERS HELP PREVENT MOISTURE DAMAGE

"REGULAR" —with screen and all-weather deflector.

"LD"—screened for interior and protected exterior locations.

Specify the installation of the original Midget Louvers in eaves, walls, floors to release trapped moisture, excess heat that cause corrosion, peeling paint. This economical ventilation method is especially valuable where the new non-porous building materials are used. Midget Louvers install easily in wood, metal and concrete without nails or screws — merely tap into drilled hole. Available in anodized aluminum, chrome and copper in seven sizes from 1 inch - 6 inches. Sold by leading building supply dealers, or write:

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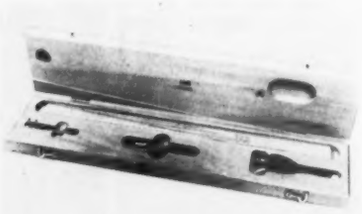
6 WALL STREET • NORWALK, CONNECTICUT

Circle 135 for further information

available: 14⅜", 18" and 26".
AIA FILE NO. 35-H-4
MFR: MICHAEL LITH SALES CORP.
Circle 254 for further information



LETTERING SET WITH ADJUSTABLE SCRIBER

MFR'S DESCRIPTION: *8935 Doric* lettering set is economy priced set combining both upper and lower-case letters and adjustable scriber for slant lettering.
USES: as drafting aid.
SPECS/FEATURES: set has complete lower-case in three sizes, in addition to standard capital letters, symbols and numerals. Also included are two lettering pens, lead holder, lettering ink cartridge and clear plastic straightedge. Scriber permits forward slant of as much as 22°.
AIA FILE NO. 35-H-3
MFR: KEUFFEL & ESSER CO.
Circle 255 for further information

RESTYLED PORTABLE TYPEWRITER

MFR'S DESCRIPTION: restyled portable typewriter, incorporating office machine features, introduced.
USES: office and field uses.
SPECS/FEATURES: *Travel-riter* is engineered to provide segment shift action which allows capital letters to be printed without raising carriage, insure evenness of impression and sharper printwork, according to mfr. Other features: spacing for one, one and one half and two lines; 42 key keyboard with five extra characters; and adjustable margin setting buttons.
AIA FILE NO. 35-H-4
MFR: REMINGTON RAND DIV., SPERRY RAND CORP.
Circle 256 for further information

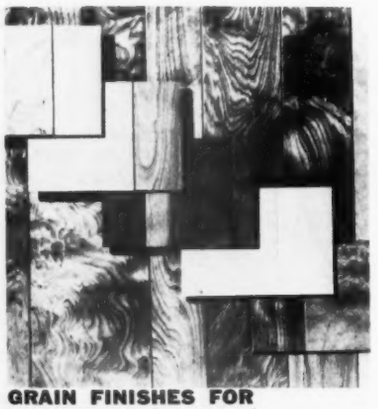
FIXING AGENT FOR PENCIL TRACINGS

MFR'S DESCRIPTION: *Fixatif* is aerosol-packaged fixing agent which retails for $1.95 per can.
USES: in drafting offices for protection of pencil tracings.
SPECS/FEATURES: stated to protect any pencil tracing from smudging when in use or stored in files. Is erasable, fast drying, non-yellowing, crystal clear and free from odors, according to mfr.
AIA FILE NO. 35-H-3
MFR: THE EAGLE PENCIL CO.
Circle 257 for further information

WOOD UNITS

NAILABLE SHEATHING FOR FRAME CONSTRUCTION

MFR'S DESCRIPTION: *Graylite XXX-N* sheathing is structural insulation board said to have exceptional nail-holding power.
USES: residential and commercial frame construction.
SPECS/FEATURES: intended to be used for direct application of wood shingles and asbestos cement shingles. Reported to have greater bracing strength, meeting FHA requirements for use without corner bracing. High moisture resistance and greater structural strength claimed. Applicable with nails or staples.
AIA FILE NO. 19-D-3
MFR: INSULITE
Circle 258 for further information



GRAIN FINISHES FOR HARDWOOD PANELING

MFR'S DESCRIPTION: teak and oak wood grain finishes now available in *Grain-Ply* hardwood paneling.
USES: residential interiors.
SPECS/FEATURES: advantages include use of genuine hardwood plywood; presealing for durable finish and stable panel; and use of finish resistant to ink, alcohol, grease and other household chemicals. Offered in standard size 4' x 8' and 10' panels in ¼" thickness. Random grooving

and beveled edges given to provide continuous plank effect.
AIA FILE NO. 19-E-6
MFR: GEORGIA-PACIFIC CORP.
Circle 259 for further information

MISCELLANY

COLOR PALETTE FOR MOSAIC TILES

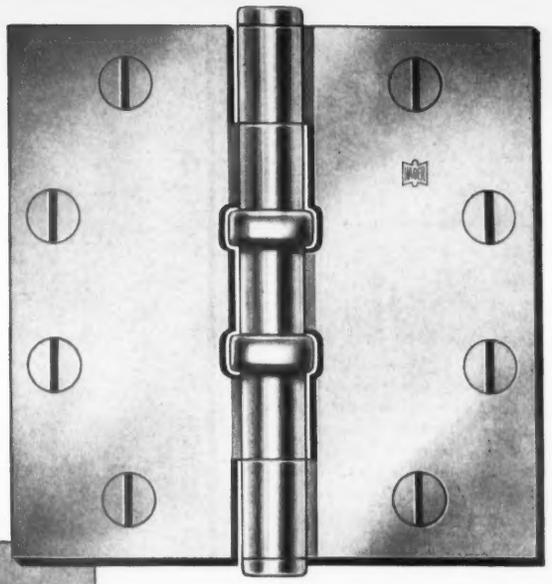
MFR'S DESCRIPTION: palette of *Staccato* colors available on weatherproof body in modular 1" x 1" units.
USES: interior or exterior vertical surfaces.
SPECS/FEATURES: developed for use as decorative accents; can be used with glazed or unglazed mosaics. Not recommended for floors or countertops. Colors are cardinal, cherry, poppy, tangerine, forsythia, chartreuse, lime, laurel green, peacock blue, royal blue, opal, jet, silver and gold.
AIA FILE NO. 23-E
MFR: THE MOSAIC TILE CO.
Circle 260 for further information

METHOD FOR CONNECTING PLAIN END PIPE

MFR'S DESCRIPTION: *Plainlock* method announced to afford simple, low cost and leak tight method of connecting plain end pipe with positive grip couplings and *Full-Flow* fittings.
USES: piping system installations.
SPECS/FEATURES: method consists of couplings and fittings for use with plain or beveled end pipe. Couplings are designed with two bolts for fast, easy installation and are fitted with hardened stainless steel grips that engage pipe ends and securely lock them together. Fittings are engineered with long radii sweeps for good hydraulics and minimum friction loss. Ends are designed for maximum gripping efficiency. Fittings are available with plain ends or in combination of plain and grooved, threaded or flanged ends for interconnection of other piping systems.
AIA FILE NO. 29-B
MFR: VICTAULIC CO. OF AMERICA
Circle 261 for further information

CONNECTED FUSE PULLER PANEL

MFR'S DESCRIPTION: 100 amp, parallel connected fuse puller panel with 12 plug fuse branches and four branch pullers announced.
USES: control water heaters or other separately metered appliances.
SPECS/FEATURES: one of four branch pullers is sealable for use with separately metered equipment. Unit incorporates 60 amp main puller for plug fuse lighting and appliance circuits, another 60 amp puller for the range and two 30 amp branch pullers.
AIA FILE NO. 31-D
MFR: CIRCUIT PROTECTIVE DEVICES DEPT., GENERAL ELECTRIC CO.
Circle 262 for further information



Available on Brass or Steel Butts— ...specify LS

conqueror of all challengers!

THE ORIGINAL *Luma-Sheen* FINISH
T M REG.
BY HAGER

STANDARD BEARER TO THE HINGE INDUSTRY!

Since 1954, when Hager first introduced *Permanized* LUMA-SHEEN Finish–the *original* and *first true aluminum colored finish*–it's become the most widely acclaimed finish of the door hardware industry!

Other manufacturers have tried desperately to duplicate and imitate the superb excellence of LUMA-SHEEN. When they compromised quality ... they failed!

TRUE TO ITS PURPOSE... LUMA-SHEEN Finish–first *of* the industry–today is still first *in* the industry, after four long years! Specifiers, Consultants and Builders recognize that *permanized* LUMA-SHEEN has a can't-be-copied Hager craftsmanship that *out-performs* and *out-matches* them all!

PROOF OF INTEGRITY AND ENDURANCE!

1954–The Industry's first and finest! LUMA-SHEEN Finish–the *only* electrolytically-coated True Aluminum Color that matched other aluminum door hardware and trim.

1958–Proved by installation in practically every conceivable situation! LUMA-SHEEN remains the only finish that retains original soft lustrous beauty ... resists and withstands corrosion.

When you want it to stand up to the test of time–specify Hager LUMA-SHEEN (symbol LS) on that next job.

C. HAGER & SONS HINGE MFG. CO., ST. LOUIS 4, MO., U.S.A.
HAGER HINGE CANADA LIMITED, KITCHENER, ONTARIO

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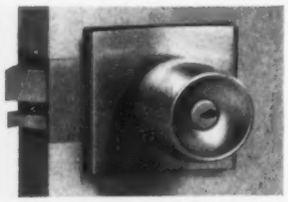
EVERYTHING HINGES ON *Hager!*

Circle 136 for further information

classic designs in metals...

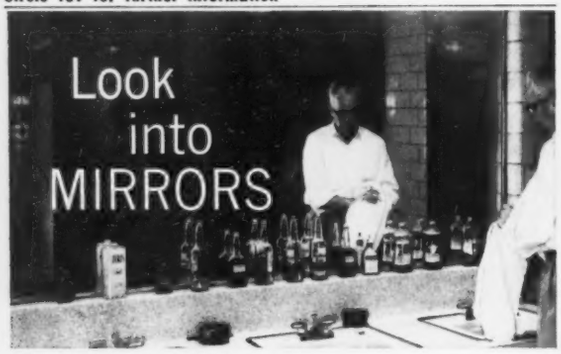
by russwin

The Russwin Unity Design Uniloc — Handsomely contoured escutcheons and "hand-fitting" knob design distinguish this Russwin Uniloc. It is available in cast brass, bronze or aluminum . . . all standard finishes. No disassembly for installation. For details on complete line, write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.



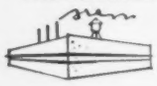
RUSSWIN

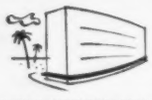
Circle 137 for further information



by Faries-McMeekan for

INDUSTRIES





INSTITUTIONS

RESIDENCES

If you have a question regarding mirrors or would like a copy of our latest catalog be sure to write today. We offer a complete selection of framed and unframed plate glass mirrors in standard and special sizes for walls, doors and other needs. In small quantities or large —for your mirror requirements call on:

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Write for catalog

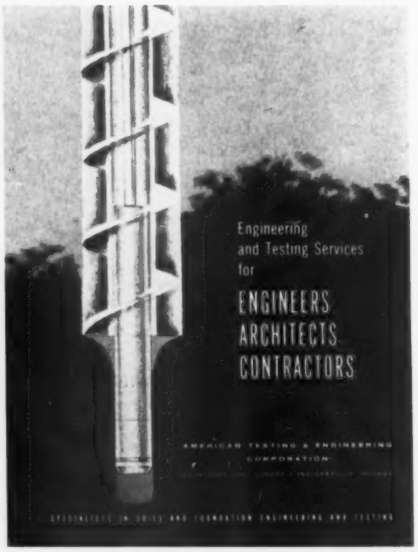
P. O. Box 35, Phone JAckson 2-8660, Elkhart, Ind.

Circle 138 for further information

LITERATURE

Literature cited in this department is available from various manufacturers and associations free of charge, except where indicated. To obtain copies, circle the keyed numbers on the reader service cards facing pages 1 and 80.

300



301

ORNAMENTAL GRILLEWORK

Recent catalog treats of *FiliGrille*, ¾" thick, ornamental styrene grillework for interior or exterior use. Material is available in standard designs, factory-fabricated in customized panels; claimed to be suitable for use as floating screens, space dividers and wall decorations in hotels, restaurants, churches, hospitals, offices and homes.

AIA FILE NO. 24-E

MFR: HOLCOMB & HOKE MFG. CO., INC.

Circle 300

SOIL TESTING

Prepared for architects, engineers and contractors, recent brochure describes range of soils and foundation testing services available. Illustrations show typical boring, sampling and testing procedures. Sample reports demonstrate how test data is analyzed and correlated to aid in solving design and construction problems. Services include design of natural earth structures, compaction control, construction inspection and concrete testing. (8 pp.)

AIA FILE NO. 1-E

MFR: AMERICAN TESTING AND ENGINEERING CORP.

Circle 301

FIREPLACE CONSTRUCTION

For a Perfect Fireplace at Less Cost, is guide furnished to provide suggestions and techniques for saving of time, money and materials in fireplace construction. Sample hearth plans are illustrated, and opening size, firebox and flue proportions are provided. Specifications, diagrams and photographs are shown for installation of *Benefire* complete fireplace form. Variety of grille designs is illustrated. Scale construction details for 7 different openings are included. (8 pp.)

AIA FILE NO. 14-E-5

MFR: BENNETT-IRELAND, INC.

Circle 302

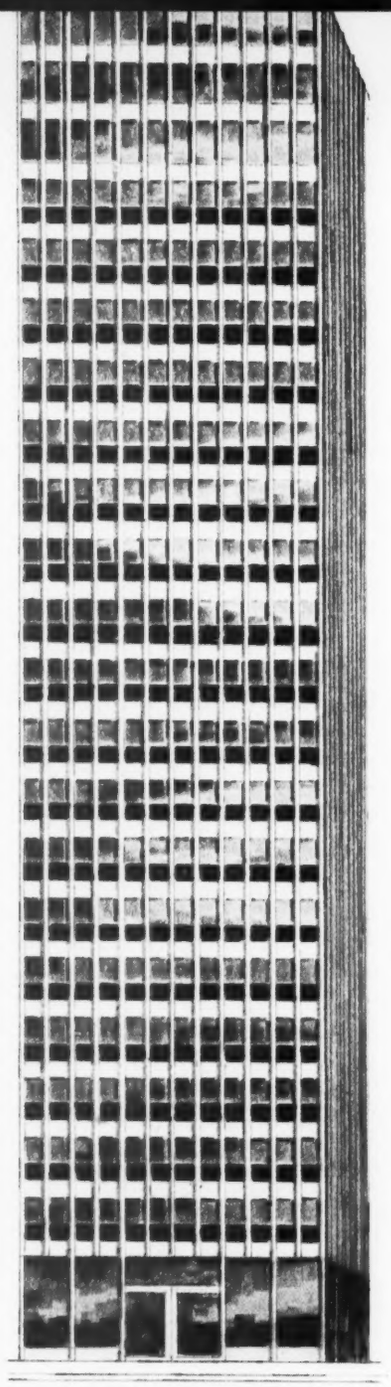
PLASTER AGGREGATE BULLETIN
Bulletin covering plastering specifications and fireproofing data on *Permalite* expanded plaster aggregate now available. Included is discussion of lightweight fireproofing, mixing instructions and specifications. Tables give recommended proportions of material to be used with gypsum plaster, thermal conductivity in each proportion and sound reduction qualities. Table of typical fire ratings also provided for aggregate plasters in applications such as structural steel columns, walls, partitions, floors, roofs and ceilings. (8 pp.)
AIA FILE NO. 21-A-5
MFR: MINING AND MINERAL PRODUCTS DIV., GREAT LAKES CARBON CORP.
Circle 303

VENTILATED SKYLIGHTS
Bulletin 60-LV presents details and specifications on *Astro-Lites* (skylights) and *Astro-Vents* (ventilated skylights). Former feature one-piece acrylic resin dome; are offered in square or rectangular shapes ranging in length from 14" to 115". Latter, ventilated units, suitable for commercial, institutional and industrial requirements, reported as novel combination skylight-ventilator; available with air moving capacities up to 4,400 cfm. Installation drawings, dimensions, dome and electrical specifications are included. (8 pp.)
AIA FILE NO. 12-K
MFR: JENN-AIR PRODUCTS CO., INC.
Circle 304

PLUMBING

NOZZLE BULLETIN
Current bulletin describes line of spray nozzles for spraying liquids into mushroom shapes of varying heights and angles. Designed for use where medium to large capacities and coarse sprays are desired, nozzles may have wide applications on decorative water fountains. Units are supplied in 2" 4" and 6" sizes, with 45°, 30° or 20° angle spray. Bulletin includes information on capacities, dimensions, materials of construction and principles of design. (2 pp.)
AIA FILE NO. 29
MFR: SCHUTTE AND KOERTING CO.
Circle 305

PLUMBING MANUAL
Plumbing for Flexicore Decks, is manual currently available. Manual explains how openings can be designed into precast concrete decks and framed during construction, or hand-cut or drilled after deck is in place. Also describes typical plumbing conditions and shows methods of providing openings for each. Manual is illustrated. (12 pp.)
AIA FILE NO. 4-K
MFR: THE FLEXICORE CO., INC.
Circle 306



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AMARLITE

Artistry in Aluminum

is yours from
Portal to Penthouse

Architects across the nation have come to expect the finest quality in Amarlite Aluminum Entrances and Store Fronts – polished, buffed and anodized aluminum extrusions with clean crisp lines and flawless beauty. Now a comprehensive line of Amarlite Curtain Wall Systems – five distinct series – is also available. Coordinate all your exterior metal with the same beauty-matched finish from the ground floor up. Specify Amarlite for dependability with a fresh new look in the years to come.

■ *Write for free combination catalog.*

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AMARLITE

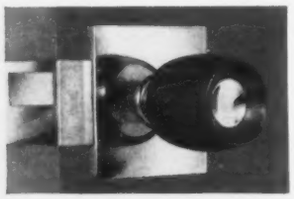
American Art Metals Company
Artistry in Aluminum
ENTRANCES / STORE FRONTS / CURTAIN WALLS

GENERAL OFFICES: P. O. BOX 7188, STATION "C", ATLANTA, GA. • NEW YORK, N. Y. • CHICAGO, ILL. • DALLAS, TEXAS • PARAMUS, N. J.
Circle 139 for further information

exotic wood knobs for interiors...

by russwin

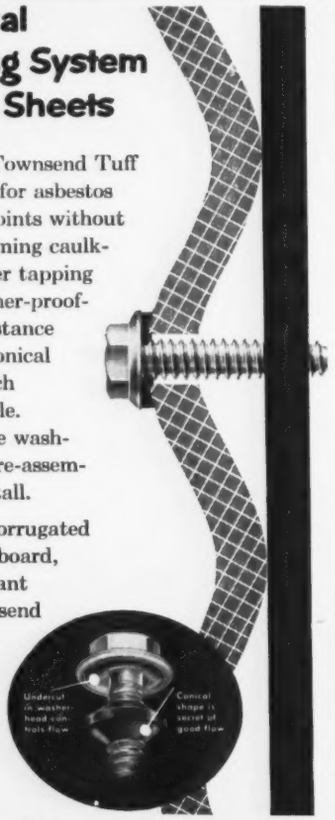
The Russwin Modera Design Uniloc with knobs of beautiful rosewood, cocobolo, walnut and ebony. Exceptionally durable woods are carefully selected for their beautiful coloring. For details on complete line, write Russell & Erwin Division, The American Hardware Corporation, New Britain, Connecticut.



RUSSWIN

Circle 140 for further information

An Economical New Fastening System For Asbestos Sheets



The economical new Townsend Tuff Tite fastening system for asbestos produces waterproof joints without expensive, time-consuming caulking, whether you prefer tapping screws or bolts. Weather-proofing and vibration resistance are provided by the conical neoprene washer, which completely fills the hole. Fastener and neoprene washer arrive on the job pre-assembled and ready to install.

If you are fastening corrugated asbestos or sandwich board, you can effect important economies with Townsend Tuff Tites. Write for full information. Townsend Company, Engineered Fasteners Division, Box 71-V, Ellwood City, Pa.

Circle 141 for further information

LITERATURE

WASHROOM CATALOG

Washroom cabinets catalog available, containing information on washroom dispensers and receptacles. Presented data includes general descriptive information, installation suggestions, specifications, unit size and capacity and ordering information. Dispensers are shown in available colors. (8 pp.)

AIA FILE NO. 29-J

MFR: CROWN ZELLERBACH CORP.

Circle 307

KITCHEN PLUMBING

Looseleaf type manual, *Specification Manual of Plumbing Fixtures and Specialties for Institutional Kitchens*, offered, designed to aid architects and other planners in analysis and specification of all kitchen plumbing fixture requirements. Among items covered are flexible stainless steel hose assemblies, prerinsers, faucets, pedal valves, glass fillers, water stations, etc. Additional and revised sheets will be offered when available. (84 pp.)

AIA FILE NO. 29

MFR: T & S BRASS AND BRONZE WORKS, INC.

Circle 308

HVAC

HVAC SILENCERS

Recent pamphlet lists *Uni-Silencer* line of silencer products for air-conditioning, heating and ventilating equipment. Products said to be guaranteed and bonded. Literature provides dimensional data, certified sound attenuation and pressure drop tables. (8 pp.)

AIA FILE NO. 30-J

MFR: ACOUSTICAL DIV., ELOF HANSSON, INC.

Circle 309

CONVECTION HEATERS

Bulletin *L-1251* describes and illustrates uses of commercial grade *Chromalox* electric cabinet convector heater. Units described as suited for wall mounting in entrance ways, lobbies, corridors, offices, lavatories, reception rooms and hospital rooms. Available for surface or recessed mounting and with optional built-in thermostat and day-night relay. Bulletin includes sample specifications and listing of available models. (2 pp.)

AIA FILE NO. 31-K

MFR: EDWIN L. WIEGAND CO.

Circle 310

CONDENSER CATALOG

Air-cooled condenser catalog available, describing four types of units: those using propeller fans for horizontal air flow; propeller fans for vertical flow; centrifugal fans for

Circle 142 for further information →

Introducing "tuned-to-the traffic" design...

NORMAL USE
Narrow Stile 188 fills the needs of most stores and other small to medium sized buildings.

HEAVY FLOW
Extra Duty 350 is the solid choice for schools, supermarkets, wherever there's abusive traffic.

HARDEST DUTY
Wide Stile 500 offers massiveness desired for monumental type buildings, plus great strength.

QUALITY CLIENTELE
Style Leader 125 with its graceful, modern appearance says "prestige." High style, high strength.

ROUGH SERVICE
Stainless Steel 200 offers excellent resistance to wear and weather plus clean appearance.

...in NEW Kawneer DUTY-RATED ENTRANCE PACKAGES

Handsome—and then some! These new Kawneer Duty-Rated Entrance Packages introduce "tuned-to-the-traffic" design, geared to building esthetics and usage. Each has a completely concealed closer—no protruding arms or elbows. All at a highly competitive first cost, far lower installed cost. For new book, "The Second New Idea in Entrances," write—right now!

Key to the Kawneer Entrance Packages

Kawneer Concealed Overhead Closer is contained in 1¾" transom bar. No holes to dig, cement case to set, adjustments to make.

Kawneer Automatic Operator is concealed in 4½" transom bar, wired to mat through frame. Nothing in the floor or over the door.

Serving Architecture and Industry
Kawneer
General Offices NILES, MICHIGAN
ARCHITECTURAL PRODUCTS DIVISION
since 1906

use with duct-work; and centrifugal fans for residential air-conditioning. Construction features, including *Turbu-Flo* design for finned coils, are presented. Sections treat operation of air-cooled condensers under winter conditions, in indoor use and in residential and small commercial applications. Typical specifications provided. (12 pp.)
AIA FILE NO. 30-F-3
MFR: HALSTEAD & MITCHELL
Circle 311

HUMIDITY CONTROL

Recent leaflet describes *SCD* sprayed coil humidity control units, designed to maintain close humidity control and achieve cleaner air. Presented are product photographs, specifications and dimensional drawings, keyed to tabular data. Units available in 30 sizes, with cfm range 668 to 32,250, in horizontal and vertical models. (2 pp.)
AIA FILE NO. 30-F-2
MFR: DRAYER-HANSON DIV., NATIONAL-U.S. RADIATOR CORP.
Circle 312

REVISED AC CATALOG

Revised catalog for vertical and horizontal air-conditioning units offered. Literature contains general specifications, dimensions, arrangements and installation instructions for two series of units, rated from 1,200 to 34,800 cfm. Mfr emphasizes rugged and flexible construction.
AIA FILE NO. 30-F
MFR: RECOLD CORP.
Circle 313

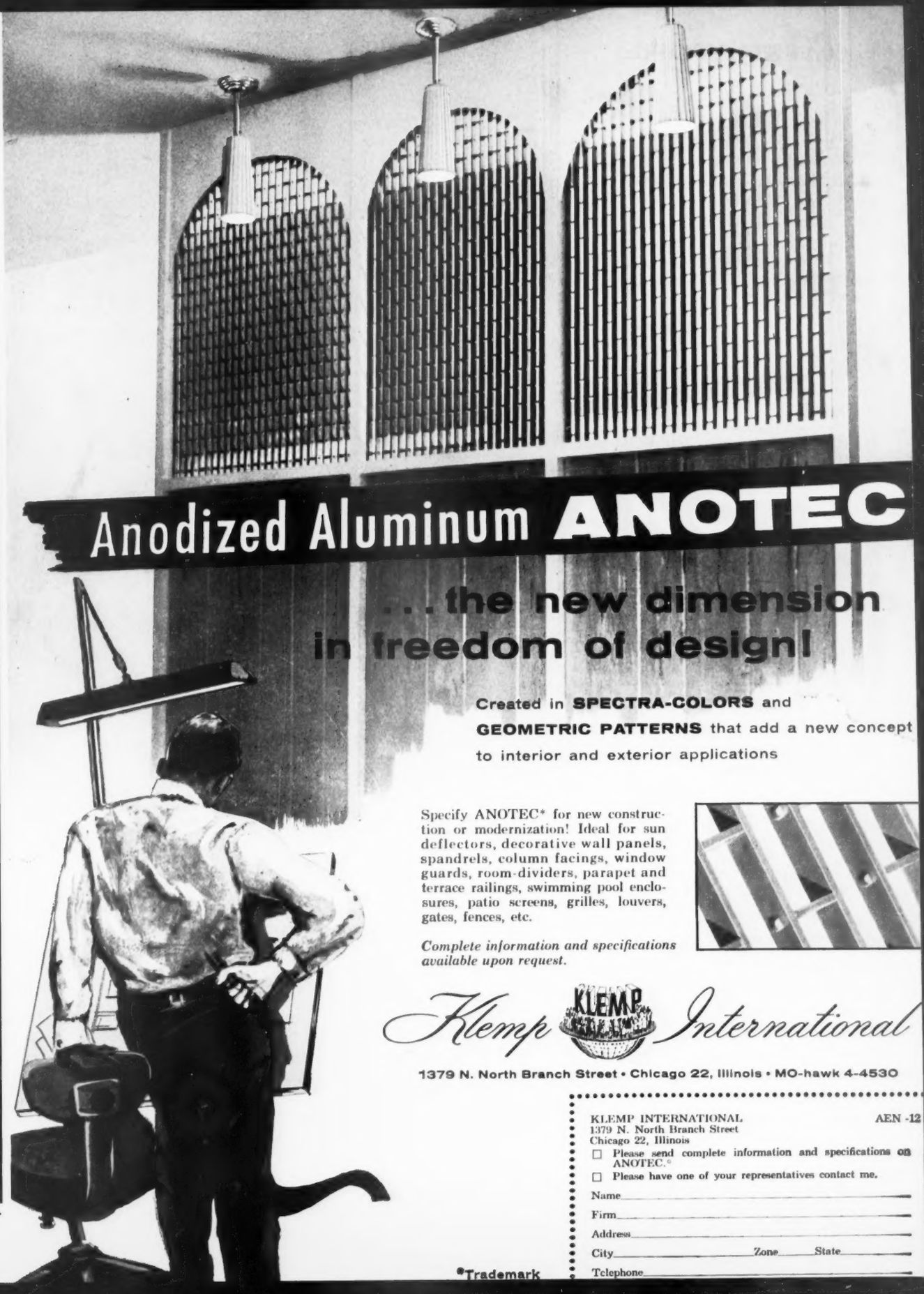
FORCED DRAFT UNITS

Recent bulletin describes forced draft, square-heat, packaged boiler-burner units for oil, gas or combination firing. Illustrated with photographs and line drawings, bulletin contains ratings, dimensions and technical data in tabular form. Specifications and list of standard factory-mounted accessories also included. (4 pp.)
AIA FILE NO. 30-B
MFR: INDUSTRIAL DIV., AMERICAN-STANDARD
Circle 314

AIR DISTRIBUTION CATALOGS

Comprehensive set of 8 air distribution catalogs, describing wide range of air diffusion equipment, now available. For reference ease, data has been published in 8 catalogs; each contains application and performance data on basic type of unit. Catalogs are: circular air diffusers; square air diffusers; straight line air diffusers; perforated air diffusers; *Diffus-A-Plate;* air diffuser accessories; high velocity units; and constant volume turbulators and LPL valves. Included are dimension drawings and tables, cfm capacities, static pressures and

Circle 143 for further information →


Anodized Aluminum ANOTEC
. . . the new dimension in freedom of design!
Created in SPECTRA-COLORS and GEOMETRIC PATTERNS that add a new concept to interior and exterior applications
Specify ANOTEC* for new construction or modernization! Ideal for sun deflectors, decorative wall panels, spandrels, column facings, window guards, room-dividers, parapet and terrace railings, swimming pool enclosures, patio screens, grilles, louvers, gates, fences, etc.
Complete information and specifications available upon request.
Klemp KLEMP International
1379 N. North Branch Street • Chicago 22, Illinois • MO-hawk 4-4530
KLEMP INTERNATIONAL AEN -12
1379 N. North Branch Street
Chicago 22, Illinois
☐ Please send complete information and specifications on ANOTEC.*
☐ Please have one of your representatives contact me.
Name
Firm
Address
City Zone State
Telephone
*Trademark

LITERATURE

radius of diffusion ratings for every available diffuser size.
AIA FILE NO. 30-J
MFR: ANEMOSTAT CORP. OF AMERICA
Circle 315

SEATING

PORTABLE FOLDING STAGES

Adaptable line of portable stages, chair and choral risers is described in current folder. Basic units, in modular sections, said to be interchangeable; can be used separately or in interlocking combinations. Reported to permit folding for space saving storage. Specifications and accessories are listed, and possible applications are described. (6 pp.)
AIA FILE NO. 35-A-1
MFR: SICO MFG. CO., INC.
Circle 316

SEATING CATALOG

Revised catalog presents details of line of folding tables, benches, choral risers, bandstands, stages and portable handling equipment for use in schools, churches, clubs, recreational centers, etc. Push button folding, glider mobility and compact storage are among features indicated. Photographs and specifications are presented. (25 pp.)
AIA FILE NO. 35-F-11
MFR: MIDWEST FOLDING PRODUCTS SALES CORP.
Circle 317

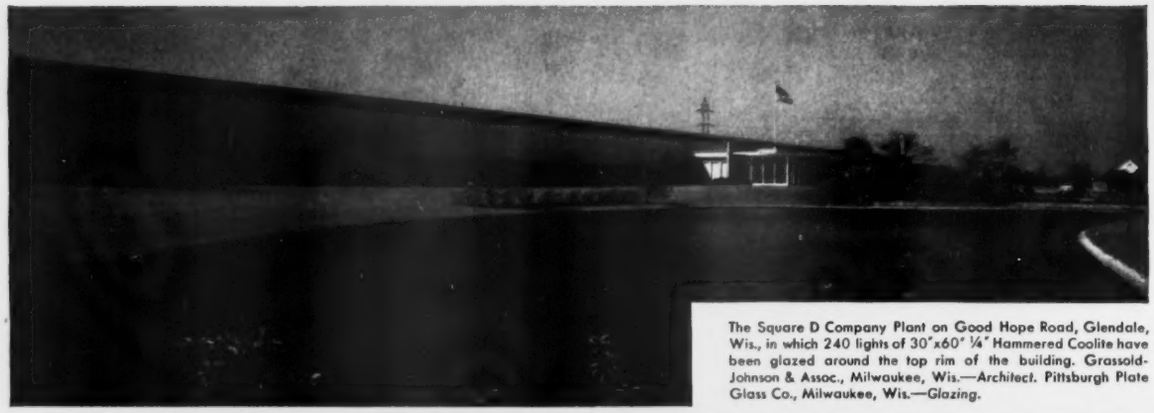
INSULATION

UNDERGROUND INSULATION

Technical bulletin on underground insulation describes methods of protecting and insulating underground steam lines and heating systems at low cost. Series of engineering drawings is presented to illustrate balanced systems. Also included are graphs for determination of heat loss which can be expected from various diameter pipes in both wet and moist soils under different atmospheric and soil temperatures. Installation data and thickness specifications also included.
AIA FILE NO. 37-D-2
MFR: INSUL-FIL CO., SUBS. MIRACLE ADHESIVES CORP.
Circle 318

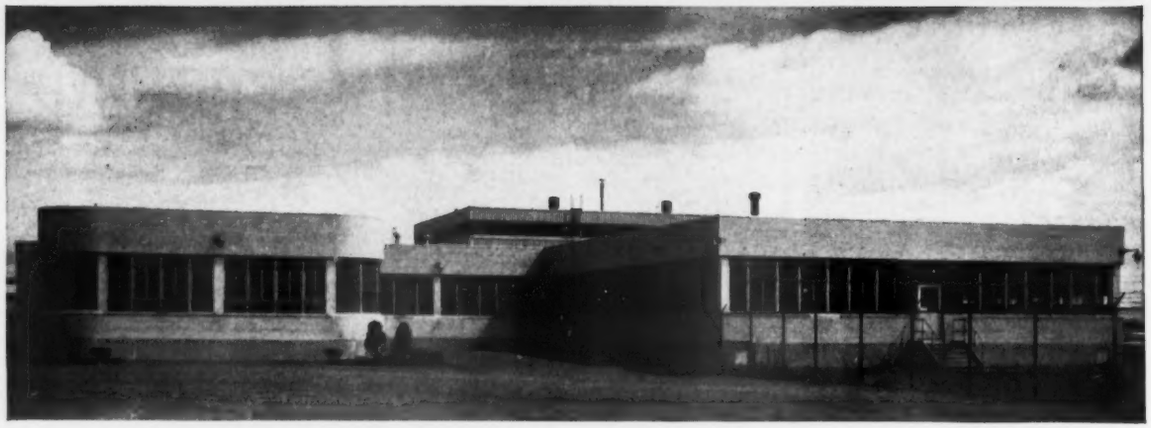
INSULATING CONCRETE

Recent bulletin covers use of *Permalite* expanded perlite insulating concrete in roof decks and floor fills. Tables included to show typical mix designs, physical properties and thermal conductivity, as well as typical load test data for concrete decks at various spans. Complete specifications given. Sections treat material as fireproof roof insulation, as fill over corrugated steel decking and

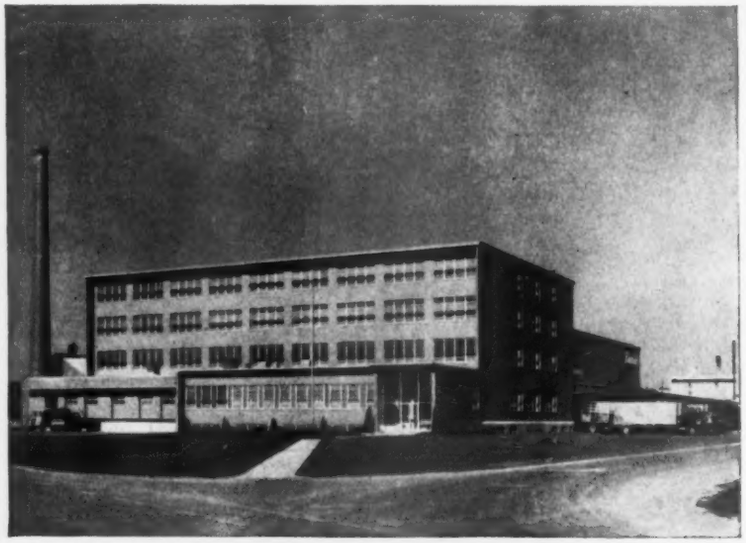


The Square D Company Plant on Good Hope Road, Glendale, Wis., in which 240 lights of 30"x60" ¼" Hammered Coolite have been glazed around the top rim of the building. Grassold-Johnson & Assoc., Milwaukee, Wis.—*Architect.* Pittsburgh Plate Glass Co., Milwaukee, Wis.—*Glazing.*

MISSISSIPPI GLASS . . .



Speer Carbon Company, Niagara Falls, N. Y. Laboratory glazed with ⅛" Luxlite Coolite, Glare Reduced One Side. Pilot house glazed with ¼" Luxlite Coolite Wire Glass. Otto Preis, New York, N. Y.—*Architect.* Walter J. Johnson, Niagara Falls, N. Y.—*Contractor.* United Glass Company, Buffalo, N. Y.—*Glazing Contractor.*



Borden Foods Company, Plymouth, Wis. South, east, and west elevations glazed with ⅛" Mississippi Luxlite Coolite, Heat Absorbing Glass. Cowell & Robinson, New York, N. Y.,—*Architects-Engineers.* McDonough Construction Company of Georgia—*Contractors.*

SEE OUR CATALOG IN SWEET'S OR WRITE FOR COPY

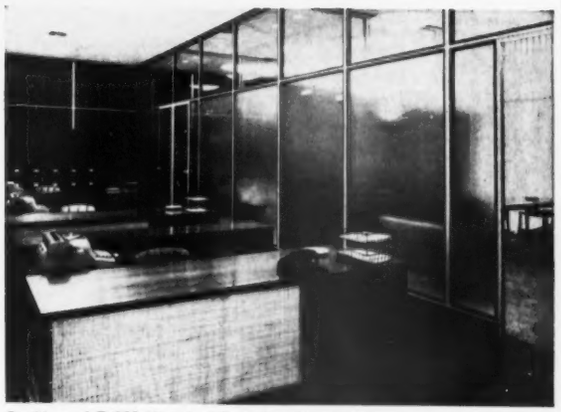
WORLD'S LARGEST

Circle 144 for further information

I. B. M. Electric Typewriter Plant, Lexington, Kentucky, where 35,000 sq. ft. of ¼" Luxlite Coolite, Glare Reduced, is installed. Fordyce & Hamby, Associates—*Architecture and Engineering.* Gilbane Construction Company—*General Contractor.* Pittsburgh Plate Glass Company, Lexington, Kentucky—*Glass and Glazing.*

. . . IN *Better* BUILDINGS EVERYWHERE

Pace setter in building progress, Mississippi glass helps achieve the ultimate in natural lighting . . . promotes truly functional architecture adapted to today's needs . . . offers a new dramatic texture that enhances the appearance of any structure. That's why today's leading architects are taking fullest advantage of translucent glass. Their outstanding buildings enjoy more and better daylighting per glazing dollar because translucent glass diffuses daylight deep into interiors to achieve even, comfortable, over-all illumination at low cost, and translucent glass helps create a feeling of spaciousness and comfort with resultant efficiencies and improved morale. For utility, beauty, and variety unmatched by any other glazing medium, specify Mississippi glass. Available in an exciting selection of patterns, wired and unwired, at better distributors everywhere.



Partitions of 7/32" Mississippi Factrolite Glass in Mutual Insurance Company of Hartford. Interior by Associated Designers for Interiors, Inc.

Write for new 1960 catalog. Address Department 18.

MISSISSIPPI GLASS COMPANY

NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

88 Angelica Street • St. Louis 7, Missouri

MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

Circle 144 for further information

LITERATURE

as fill over structural concrete. Data included on use of material with paperboard wire mesh, with formboard systems and with rib metal lath. Analysis of insulating concrete fire ratings is included. (8 pp.)
AIA FILE NO. 37-B-2
MFR: MINING AND MINERAL PRODUCTS DIV., GREAT LAKES CARBON CORP.
Circle 319

REFLECTIVE INSULATION

Use of reflective insulation in reducing expense of home construction is explained in current pamphlet. Charts and photographs aid in showing 8 ways lightweight insulation materials can provide more insulation value. Chart compares various insulation materials currently available, and respective costs involved.
AIA FILE NO. 37-C-3
MFR: REFLECTAL CORP., SUBS., BORG-WARNER CORP.
Circle 320

PAINTING INSULATION BOARD

Booklet prepared jointly by Insulation Board Institute and National Paint, Varnish and Lacquer Assn., presents proper methods for painting insulation board. Information provided on various types of insulation board and suggestions presented for painting each. Glossary of terms is included. (10 pp.)
AIA FILE NO. 37-D
ASSN: INSULATION BOARD INSTITUTE
Circle 321

DOORS/WINDOWS

DOOR CATALOG

Recent catalog presents details of line of 1960 sliding glass doors. Sections are devoted to *Series A*, custom quality unit; *Series MS*, multiple sliding unit; *Series M*, medium price quality door; *Series I*, budget price door; and *Series T*, insulated door. Specifications and information on window wall system also included. (12 pp.)
AIA FILE NO. 16-E
MFR: ADOR CORP.
Circle 322

WINDOW DETAILS

Series of tracing templates, covering window details, offered to registered architects only. Templates cover, among other types, church windows, mullion details, recessed panel doors, intermediate tubular casement units, combination, pivoted vent and glass block windows. Charts included on weights and areas of glass light.
AIA FILE NO. 16
MFR: VALLEY METAL PRODUCTS CO., SUBS., MUELLER BRASS CO.
Circle 323

SLIDING DOORS/WINDOWS

Recent catalog notes installation of

Aren't You Entitled to the Best?

If you were a doctor, you wouldn't use a cheap stethoscope. If you were a violinist, you wouldn't think of playing a concert on a scratchy fiddle.

As a man of standing in your profession—you, too, are entitled to the best. It doesn't make sense to settle for a cheap lead holder, the most important, the most used tool in your profession, whether you are an engineer, designer, draftsman or architect.

A.W.Faber Locktite 9800 is not a luxury. It is a necessity. It is the ultimate means by which you translate your creative skills. It is the bedrock of your ability, the criterion of your worth—the direct influence of your livelihood—and the index of your future success. In the light of these values, can you afford to use a less-than-best lead holder?

Only Locktite 9800 has all of these exclusive advantages:

- **Long tapered spiral metal grip that reduces finger fatigue.**
- **Gun-rifled clutch that grips the lead like a bulldog.**
- **TEL-A-GRADE indicator which instantly shows degree of lead in use.**

Plus perfect balance and featherweight lightness.

Try Locktite, buy Locktite 9800 today, the top quality lead holder backed by two centuries of experience.

FULLY GUARANTEED!

If it ever happens, that any part of a LOCKTITE Holder breaks in normal usage, the entire holder will be replaced free of charge.

#9030 Imported CASTELL Black Gold Refill Leads fit any standard holder. Perfectly mated with LOCKTITE. Sold by all good Dealers.

A.W.Faber-Castell Pencil Co., Inc., Newark 3, N. J.

Circle 145 for further information

LITERATURE

single and multiple gliding door units, panel wall windows and sliding windows. Windows and gliding doors are available glazed with double insulating glass. Also contained are photographs, tables of dimensions and glass sizes, detail drawings of units, installation details and accessory units. (4 pp.)
AIA FILE NO. 16
MFR: O. S. KEENE CO., INC.
Circle 324

CURTAIN WALLS/COATINGS

INSULATED CURTAIN WALLS

Current catalog describes *Thermo-Sash*, insulated curtain wall system, as well as single and double hung windows. Publication describes insulating advantages of system and presents illustrations of recent schools, churches and other buildings utilizing system. Detail drawings and specifications also included. (12 pp.)
AIA FILE NO. 17-A
MFR: KESKO PRODUCTS
Circle 325

PROTECTIVE COATING GUIDE

Industrial catalog available, covering *Derusto* protective coating for rust prevention. Catalog features selector guide to evaluate technical properties of various coatings and enable user to determine most suitable product for wide variety of industrial uses. Paint chips also included to facilitate color matching. Intended as basic reference piece. (16 pp.)
AIA FILE NO. 25-B-241
MFR: MASTER BRONZE POWDER CO., INC.
Circle 326

SURFACE PROTECTION

Engineering data sheet offered, describing *Nicrocoat* process for oxidation, friction, corrosion and abrasion resistance on such materials as pure copper, molybdenum, molybdenum alloys, iron and nickel base alloys which do not contain excessive amounts of titanium, aluminum or nitrogen. Sheet discusses physical, chemical and fabrication properties of surface protection provided by process, covering application methods, thickness specifications and fusing procedures. (2 pp.)
AIA FILE NO. 25-C-3
MFR: WALL COLMONOY CORP.
Circle 327

CURTAIN WALL GUIDE

Offered to architects and any others who frequently utilize services of metal curtain wall fabricators, current booklet entitled, *What The Architect Should Expect From His Curtain Wall Fabricator*, is guide to

planning a school or library?

get help from these 2 STACOR equipment catalogs

They show space-saving, economical, attractive units . . . ways in which to use them . . . features that have made the Stacor name famous for well designed, well made, well accepted equipment.

WRITE, WIRE, PHONE FOR YOUR COPIES TODAY.

STACOR EQUIPMENT CO
Manufacturers of Lifetime Quality Equipment for Schools, Libraries & Industry
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Circle 146 for further information

RUGGED and RIGHT!

BOMMER INDUSTRIAL HINGES and SPRING STEEL BUMPERS

#17042 Industrial Hinge
#170 Spring Steel Bumper

Ideal for industrial trucking doors—heavy duty—double acting — four springs in each hinge—individually adjustable—no sagging—door held securely by box clamps and thru-bolts—bumpers absorb shock of motorized trucks — protect doors — simple installation—variety of finishes.

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SPRING HINGE CO. INC.
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Circle 147 for further information

qualifications and services which the architect should require of the fabricator he consults on engineering, fabrication and installation of metal curtain wall systems. Booklet deals with all aspects of fabricator's proper functions, covering areas of responsibility from preliminary consultation to financial stability; includes facilities, technical services, competence and dependability. (8 pp.)
AIA FILE NO. 17-A
MFR: ALBRO METAL PRODUCTS CORP.
Circle 328

LIGHTING

HOSPITAL BED LIGHTS

Lighting units designed for hospital, hotel and dormitory installations are presented in illustrated brochure. Bed lights, UL approved, reportedly provide both indirect and direct illumination in one unit. Light sources are separately controlled. Light series with adjustable arm also included in brochure. (4 pp.)
AIA FILE NO. 31-F-28
MFR: PRESCOLITE MFG. CORP.
Circle 329

ALUMINUM FIXTURES

Line of industrial vaportight, aluminum lighting fixtures announced in recent bulletin. Contained are descriptions of design, materials and reliability features. Tabular data includes descriptions, lamp sizes, interchangeable mounting adapters, accessories and information on globes, guards, reflectors and mounting plates. (4 pp.)
AIA FILE NO. 31-F-28
MFR: THE PYLE-NATIONAL CO.
Circle 330

CEILING SYSTEM

Current brochure outlines *Louverall Series 1100* luminous ceiling system, consisting of grid, hanger and panel; panels are aluminum, said to be corrosion resistant and fireproof. System is applicable as wall to wall or floating ceilings. Brochure provides descriptions of finishes, accessories, installation details, specifications and ordering information. Price list included. (4 pp.)
AIA FILE NO. 31-F-231
MFR: COLUMBIA LIGHTING CO.
Circle 331

FLOOR UNITS

ELEVATED FLOORS

Features of *Elaflor*, elevated aluminum flooring, are presented in current booklet. Flooring system was designed as a raised floor with removable panels, under which computer cable runs, connections, air-conditioning ducts, electric wiring, telephone lines, plenum chambers, etc. can be installed and remain accessible. Strong supporting aluminum structure, adjustable height, lightweight panels, flexibility, fire resistance, economy and freedom from maintenance are emphasized. Installation photographs, specifications and section drawings are included. (12 pp.)
AIA FILE NO. 23-J
MFR: LISKEY ALUMINUM, INC.
Circle 332

SCHOOL SHOP FLOORS

Facts on Floors in School Shops now available, summarizing results of survey covering 57 school districts, queried to determine: what kind of shop floors actually exist in school shops today; what preferences exist for one type or another; and what changes may be expected as a result of economy pressures and introduction of new floor covering types. Results show hardwood strip to predominate among most common types. (20 pp.)
AIA FILE NO. 23-B
MFR: J. W. WELLS LUMBER CO.
Circle 333

CERAMIC TILE CATALOG

Recent catalog contains presentation of complete ceramic tile line. Features and uses are discussed and emphasis is placed on recent developments, including *Tile Gems*, 1⅜" tiles in color for both interiors and exteriors. Color charts show addition of new colors in glazed tiles. Section is devoted to color reproductions of basic patterns and designs in ceramic mosaics. Photographs of installations are included. (32 pp.)
AIA FILE NO. 23-A
MFR: AMERICAN OLEAN TILE CO., INC.
Circle 334

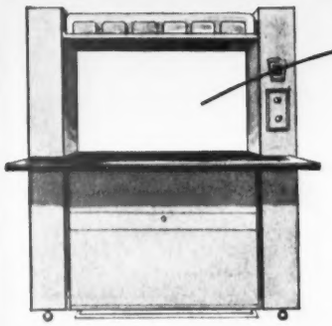
MISCELLANY

PNEUMATIC HANDLING DEVICES

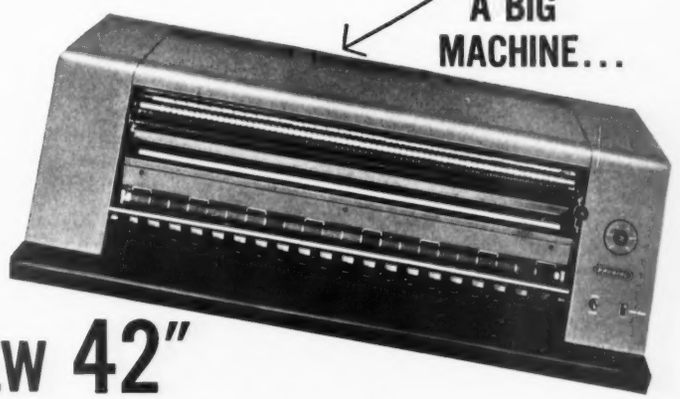
Recent brochure, *New Concepts With Pneumatics*, presents details, photographs, line drawings, construction and operating principles of *Pneuma-Grip*, pneumatic handling system, and *Pneuma-Seal*, pneumatic sealing formulation for radiation resistant applications such as hot and cold box sealing, dust free enclosures, test cells and vacuum containers. (8 pp.)
AIA FILE NO. 35-H-21
MFR: THE PRESRAY CORP., SUBS. PAWLING RUBBER CORP.
Circle 335

METAL LATH BULLETIN

Technical Bulletin no. 2, entitled *Studless Metal Lath and Plaster Two-Inch Solid Partitions*, in revised form, offered to architects, engineers and specification writers. Current bulletin incorporates recent specification amendments, revised layout detailed drawings and other pertinent information which has become available since 1956. Among items dis-



TAKES THE HEART RIGHT OUT OF A BIG MACHINE...



NEW 42" TABLE MODEL WHITEPRINTER!

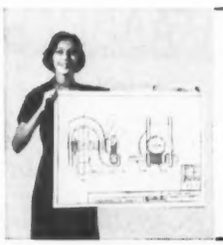
Bruning's new table-size Copyflex Model 320 gives you big machine capacity and performance at a price that puts many a big machine to shame! It's the perfect whiteprinter for firms and departments with *big* tracings—but with *small* reproduction budgets, cramped machine space, or both.

The amazing Model 320 gives you practically everything important you'd look for in a big machine . . . 42" printing width . . . mechanical speed up to 25 fpm . . . *complete* development of all types of materials at single pass through the machine at any machine speed . . . simple, one-knob speed control. Add to those the exclusive Copyflex advantages: fume-free operation, no vents, no plumbing. And, finally, to win the hearts of all, the 320 produces sharp, black-on-white prints at the low cost of only 1¼ cents per square foot!

Whether it's your first whiteprinter or an auxiliary whiteprinter, you just can't afford not to investigate the low-cost, high-output Model 320

BRUNING Copyflex®

Low-Cost Diazo Reproduction at Its Best!



Charles Bruning Company, Inc. Dept. 4-WB
1800 Central Rd., Mt. Prospect, Illinois
Offices in Principal U. S. Cities
In Canada: 103 Church St., Toronto 1, Ont.

Please send me more information on your new Copyflex Model 320.

Name_____ Title_____
Company_____
Address_____
City_____ County_____ State_____

Circle 148 for further information

LITERATURE

cussed are recommended construction techniques and specifications. Details of studless metal lath and plaster solid partitions are illustrated. Emphasis is given to such qualities as rigidity, durability and fire safety of partitions. (4 pp.)
AIA FILE NO. 20-B-1
ASSN: METAL LATH MFRS. ASSN.
Circle 336

CONSTRUCTION MANUAL

Masonite Construction Manual, 1960 edition, contains sections on exterior and interior uses of *Presdwood*, hardboard panels. Manual, illustrated with detailed drawings, contains descriptions of various products, table of properties, list of available sizes and application details. Information also presented on interior products: *Panelok* wall system and *Royalcote Cherry* panels. (28 pp.)
AIA FILE NOS. 19-D-2; 23-L
MFR: MASONITE CORP.
Circle 337

CIRCUIT BREAKER BULLETIN

Bulletin offered, containing complete information on *ALB-1C* circuit breaker. Unit is low impedance, rated 5 through 75 amps. Bulletin GEA-6759 contains descriptive, dimensional and ordering information. (2 pp.)
AIA FILE NO. 31-D-4
MFR: GENERAL ELECTRIC CO.
Circle 338

FIRE RETARDANTS

Current brochure describes, among others, *Type WC* fire retardant material. Material is chemical compound, a colorless surface impregnation to slow down rate of combustion of an inflammable material. Mfr states it is suitable for flameproofing unfinished lumber, plywood, acoustical and insulation board, paper products and prefabricated construction. Brochure presents types and special features of product, in addition to test results. (4 pp.)
AIA FILE NO. 19-A-33
MFR: FLAMORT CHEMICAL CO.
Circle 339

MULTI-ARC WELDING

Illustrated bulletin presents technical and economic significance of recent developments in multi-arc welding. Included is explanation of how multi-arc principle reduces equipment requirements and simplifies installation and maintenance while producing welds of high quality. Table, summarizing comparative costs, shows how multi-arc systems can save 52 per cent in power equipment. System described as applicable to flat, vertical and overhead metallic-arc welding, in addition to tungsten arc, consumable electrode, stud welding and arc air gouging. (4 pp.)
AIA FILE NO. 31-M
MFR: J. B. NOTTINGHAM & CO., INC.
Circle 340

CLOSET ROD

Recent literature announces availability of closet rod of gold anodized aluminum. General description, specifications, ordering data and section drawings present product features. Carriers are black nylon. (2 pp.)
AIA FILE NO. 35-N-22
MFR: GRANT PULLEY & HARDWARE CORP.
Circle 341

ROOF DECK BROCHURE

Current brochure illustrates use of roof deck and form plank materials in several recent motel constructions. Open construction and use of materials for both beauty and economy are stressed. Detail drawings show erection details. (8 pp.)
AIA FILE NO. 12
MFR: TECTUM CORP.
Circle 342

ELECTRIC PLANTS/CONTROLS

As a guide to selection and installation, *Standby Electric Plants and Controls*, is offered to architects, design, consulting and electrical engineers and others who have a need for emergency electric power. Folder describes need for such power, then outlines steps to be considered before selection of electric generating plant. Models are illustrated, and tables are provided to present advantages of both gasoline and diesel-powered generator sets. (8 pp.)
AIA FILE NO. 31-A
MFR: D. W. ONAN & SONS, INC.
Circle 343

ROLLING GRILLES

Steel and aluminum rolling grilles are described in current bulletin. Mfr lists garages, school corridors, industrial plants, etc., as principal applications of units. Strength, security against entry, full visibility and free ventilation are among advantages claimed. (4 pp.)
AIA FILE NO. 14-B-6
MFR: THE COOKSON CO.
Circle 344

LABORATORY FACILITIES

Report issued, entitled, *Science Teacher Opinions*, result of survey of science teachers from 50 states, representing school enrollments from 21 to 3,300 students, on question of planning for school science facilities. Survey, generally, indicated acute need for more classroom and laboratory space and room for individual student and teacher research facilities. Aspects covered include location and size of laboratories, various light exposures and other planning details. (7 pp.)
AIA FILE NO. 35-E
ASSN: LABORATORY EQUIPMENT SECTION, SCIENTIFIC APPARATUS MAKERS ASSN.
Circle 345

GAS WELDING CATALOG

Revised catalog presents line of gas welding and cutting hand torches, outfits, tips and accessories. Descriptions, features, specifications and photographs are given for each product, and specification charts list selection information. Data included on improved units, including general purpose welding torch with stainless steel head and fixed flow valves, two series of hand cutting torches and variety of cutting and washing tips. (36 pp.)
AIA FILE NO. 36-L
MFR: AIR REDUCTION SALES CO., DIV. AIR REDUCTION CO., INC.
Circle 346

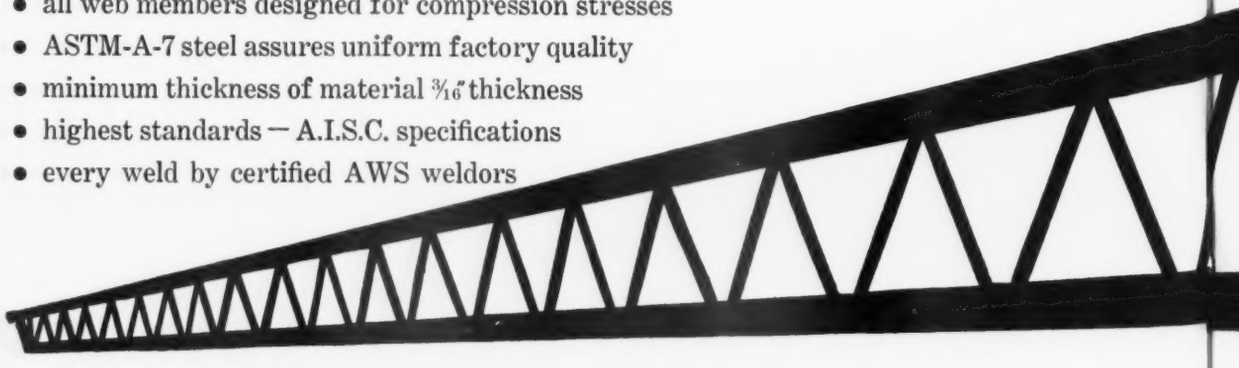
LIBRARY EQUIPMENT

Library shelving and equipment brochure offered, describing all sizes of wall shelving, both single and double faced, charging desks, tables, chairs and other miscellaneous equipment. Brochure provides specification charts, photographs and diagrams on

1950: 65 feet long . . . 1955: 125 feet long . . .

NOW: HAVEN-BUSCH T-CHORD* LONGSPAN JOISTS

- the longest steel joist made
- one-piece fabrication with matched-fit splices
- modern T-Chord* construction
- all web members designed for compression stresses
- ASTM-A-7 steel assures uniform factory quality
- minimum thickness of material 3/16" thickness
- highest standards — A.I.S.C. specifications
- every weld by certified AWS weldors



Opens new horizons for you in planning larger clearspan, column-free interiors.

*T.M. Reg.

Circle 149 for further information

items. Specifications on selection of materials, construction and various finishes also provided throughout. (16 pp.)
AIA FILE NO. 35-B
MFR: LIBRARY DIV., THE HELLER CO.
Circle 347

PRECAST CONCRETE
Recent folder describes and illustrates precast structural units. Explanations are given for fitting precast T-beams, grade beams, rectangular beams and columns and special beams and lintels to structural requirements of various types of buildings. Folder is illustrated with detail drawings and photographs. (4 pp.)
AIA FILE NO. 4
MFR: THE FLEXICORE CO., INC.
Circle 348

PLYWOOD MANUAL
Plywood catalog for 1960, intended as illustrated reference manual, is now available. Line of standard and specialty plywoods is described: redwood, pine, Douglas fir, hardwoods, high and medium density overlaid and hardboard faced. Complete grade, physical characteristics and photographs of each product are included. (20 pp.)
AIA FILE NO. 23-L
MFR: SIMPSON LOGGING CO.
Circle 349

ELECTRIC PLANTS
Trio series of diesel engine powered electric plants discussed in topical booklet. Units, 2,000, 5,000 and 7,500 watts, described as engineered for construction, marine, railroad and industrial markets. Mfr stresses fuel economy and quick, cold weather starting, due to engine's direct injection combustion system. (8 pp.)
AIA FILE NO. 31
MFR: KOHLER CO.
Circle 350

LIGHTWEIGHT CONCRETE
Current publication features wide use of lightweight aggregate concrete in modern construction. Photographs and job reports present variety of uses for material. Featured construction projects portray use of lightweight concrete as structural material for columns, beams and floor slabs, multi-story structures, thin shell concrete and bridge decks. (20 pp.)
AIA FILE NO. 4
MFR: THE MASTER BUILDERS CO., DIV. AMERICAN-MARIETTA CO.
Circle 351

GLASS CATALOG
Catalog 60-R covers line of glass for commercial and residential use. Advantages and functions of figured glass are presented, as well as light diffusion and glare reduction qualities, available types and finishes. Information also presented on glass types for non-structural and structural decoration, such as corrugated glass. Specifications and ordering information also included. (12 pp.)
AIA FILE NOS. 26-A-3; 26-A-5; 26-A-6
MFR: MISSISSIPPI GLASS CO.
Circle 352

PIPE-FITTING INSULATION
Features of *Fit*Rite*, molded fibrous glass pipe-fitting insulation, are presented in current bulletin. Data covers such aspects as design features, thermal insulating advantages, dimensional information and specifications. Relative thickness of material required for equal heat gain as compared to other media is shown for cold lines, low-pressure lines and hot lines. (4 pp.)
AIA FILE NO. 37-D-2
MFR: FIBROUS GLASS PRODUCTS, INC., SUBS. PALL CORP.
Circle 353

COMMUNICATION SYSTEM
Descriptive bulletin, through text, photographs and illustrations, gives characteristics of *Practi-Call*, all-purpose communication system, developed specifically for schools. Mfr claims system allows for both private, two-way telephone communication and for general announcements, emergency instructions, etc., which are disseminated through wall speakers in individual classrooms. System is designed to be incorporated as part of clock and program system and utilize existing bell control board. (4 pp.)
AIA FILE NO. 31-i-7
MFR: STANDARD ELECTRIC TIME CO.
Circle 354

DUST COLLECTORS
Information on *Series 342* dust collectors is available in recent brochure. List of typical industry applications is contained, itemizing those for power plants, steel production, cement and aggregate production, chemical and petroleum processing, food and grain processing and general manufacturing. Photograph explains operating characteristics; construction features also described. Discussions of field erection procedures, units with large diameter tubes and packaged collectors also contained. Nomogram presentations are provided as aid to rapid, accurate selection and determination of efficiency. Table presents dimensional and other physical information. (16 pp.)
AIA FILE NO. 35-J
MFR: INDUSTRIAL DIV., AMERICAN-STANDARD
Circle 355

WATER COOLERS
Line of blow-through type, evaporative water coolers, designated *Perma-Fan, PFCF*, is subject of topical bulletin. Mfr believes literature is successful combination of engineering data, unit selection charts and selection tables. Included are external/internal construction features of models, dimensional drawings, mean temperature difference tables and graph concerned with total heat of moist air. (8 pp.)
AIA FILE NO. 30-F-3
MFR. DRAYER-HANSON DIV., NATIONAL-U. S. RADIATOR CORP.
Circle 356

METALLIC CONDUIT
How to Bend Conduit is title of current booklet containing instructions for making precision bends in electrical metallic tubing, rigid steel and rigid aluminum conduit. Particulars given on such fundamental bends as angle bends, stub lengths, back-to-back bends, offsets and "3 bend" pipe saddles. Diagrams, offset formulae, shrink tables and gain tables included.
AIA FILE NO. 31-C-6
MFR: APPLETON ELECTRIC CO.
Circle 357

Better building begins with structural steel by

HAVEN-BUSCH *Company*

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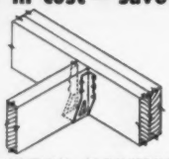

50% TOTAL SAVINGS

- Available for 2x4 to 4x14 members including double 2x6's to double 2x14's
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- Eliminate ledger stripping, notching and shimming
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Please send me your free design booklet on Teco-U-Grip joist and beam hangers

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City.....Zone.....State.....

AEN-602

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DOCUMENTS

The documents listed below are available through the associations and agencies cited. All orders should be directed accordingly.

Superintendent of Documents, *U. S. Government Printing Office, Washington 25, D. C.*

Research Highlights of the National Bureau of Standards, *Annual Report 1959, National Bureau of Standards Miscellaneous Publication 229. 169 pp. $.55.*
Illustrated report covers most important developments in bureau's research program during 1959. Describes wide range of scientific studies, laboratory experiments, and instrumentation developments arising from bureau's work in science of measurement.

Basic Theorems in Matrix Theory, *by M. Marcus. National Bureau of Standards Applied Mathematics Series 57, 1960. 27 pp. $.15.*
Survey of basic identities and inequalities of matrix theory. Included are results dealing with elementary properties, canonical forms, invariance, congruence, commutativity, orthogonalization, eigenvalues, determinants, sub-matrices, rank, determinant and rank inequalities, numerical methods for inversion and eigenvalues, and condition numbers.

National Electrical Manufacturers Assn., *155 E. 44th St., New York 17, N. Y.*

Adsorption Equipment, *AD 1-1959. $.30.*
Covers methods for determining the quality of dry air from: an atmospheric pressure adsorption-type dehumidifier in the pressure range of 0 to 10 psig; and adsorptive-type compressed gas dryers at 10 to 500 psig. It also contains definitions applying to adsorption equipment.

Manufactured Graphite Electrodes, *CG 1-1959. $.30.*
Lengths and diameters given for cylindrical manufactured graphite electrodes for use in all types of electric arc furnaces. Thread design, sizes and other pertinent details of the joining systems of such electrodes also given.

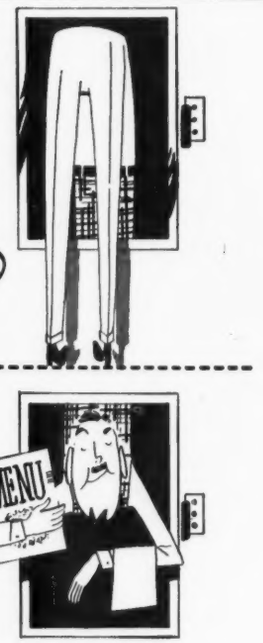
Refrigeration Controls, *DC 7-1959.*
Describes certain constructional details, classifications, ratings, ranges, differentials and other characteristics of refrigeration controls, capable of handling a current not in excess of 30 amperes or handling directly any motor having a rating not higher than 1½ hp dc or single-phase ac and 2 hp polyphase ac.

American Standard Requirements for Electrical Indicating Instruments (Panel, Switchboard and Portable Instruments), *EI 1-1959. $2.50.*
This American Standard, which has also been approved as a NEMA Standard, applies to the following kinds of electrical indicating instruments (including those with prefixes such as micro, kilo, etc.): ammeters, voltmeters, wattmeters, varmeters, frequency meters, power-factor meters, and indicating instruments functioning on the above principles but indicating derived quantities.

NEMA Standard on Nameplate Information, Ampere Ratings, Voltage Rating and Load Characteristics, *DC 6-1959. $.20.*
General information given on automatic temperature controls.

Polyurethane-coated Magnet Wire, *MW 2-1959. $.30.*

(*Continued on page 75*)



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To stand the use and abuse that it must, a dumb waiter must be carefully and soundly engineered. Emphasis should be on safety, sturdiness, heavy duty construction and most important — dependability. You can protect your clients by specifications that will insure this dependable service. Let Sedgwick study your lifting problem, make recommendations, submit suggested specifications and prepare preliminary sketches of hoistway requirements. This is a free consultation service based on over 65 years of specialized experience offered by Sedgwick.

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THE ANATOMY OF A NEW PROJECT

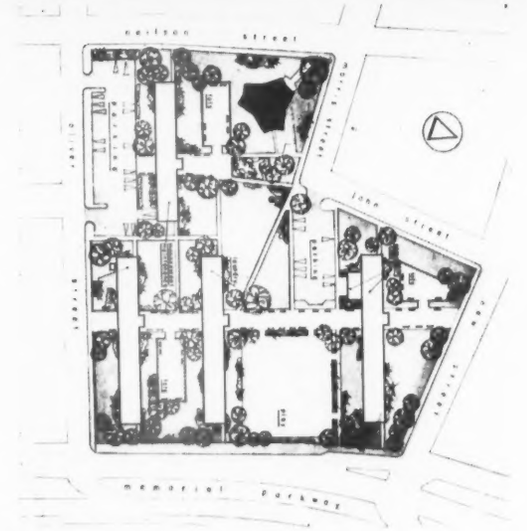
PREVIEW:16

HOUSING FOR THE ELDERLY — *project*

HOUSING AUTHORITY OF THE CITY OF NEW BRUNSWICK — *client*

TURANO-GARDNER ASSOCIATES; MERCHANT-SEIDEL-HICKEY — *architects*

NEW BRUNSWICK, NEW JERSEY — *location*



General design program

To emphasize their belief that the elderly should be physically separate yet socially an integrated part of the community, the Housing Authority of New Brunswick, New Jersey has authorized this housing project designed specifically for the aged.

The site, restricted in size, is immediately adjacent to a low-rent housing group of four nine-story apartment buildings recently completed.

In evolving a concept of living for the elderly in public housing, the architects strove (1) to provide a quality and quantity of space that would yield a simple informal and pleasant mode of living that most housing developments seem to lack; and (2) to achieve an aesthetic that would erase the stigma generally associated with public housing design.

Plan elements

Developments of the concept is based on the living unit's central core, an efficient compact mechanical and storage hub. This identical nucleus lends itself readily to apartment size required.

The basic module is a one-bedroom unit. The combination of two modules can be readily converted into a zero- and two-bedroom unit by the closing of two soundproof doors or wall panels. This affords the ability of achieving flexibility in apartment size and distribution without additional construction or alteration, nor would there be any need to change the basic core.

The basic one-bedroom apartment is devoid of waste space, and all have cross-ventilation. The net floor areas are above P.H.A. minimum and net gross area is below P. H. A. criteria. A tenant who is bed-ridden may be served efficiently from the kitchen and one restricted to a wheelchair may navigate the unit with great ease.

General features

The building includes eight typical floors consisting of six one-bedroom modules, and a floor of nine efficiency units. The upper ground floor level includes a spacious and brightly lighted lobby, a large community room containing a small kitchen unit, welfare officer facilities, and three additional efficiency units.

The building sits on a podium at this level which shall serve the community room as a protected outdoor walk and sitting area and provides access to the gardens surrounding the project. This park-like area was specially designed for the exclusive use of the elderly, creating for them a quiet and pleasant atmosphere to sit, walk and enjoy recreational activities. It will be defined and protected from the surrounding neighborhood by pierced screen walls and heavy planting areas. Included, shall be a recreational area, shuffleboard and sitting area protected by a colorful canopy with integral lighting for use on warm evenings. The lower level includes entry from the adjacent parking area, storage and mechanical equipment areas.

The circular corridor at the building core enables tenants to reach their apartment entrance regardless of the direction they take from the elevator and reduces the distance thereto.

Among the many safety features incorporated in the design of the structure, there is the complete elimination of steps and stairs to climb (except for the emergency fire stair). Tenants enter the building from a gently sloping walk. The core contains two self-service elevators (eliminating the need to use the stairs should one fail to operate). The central corridor will have a railing around its perimeter as an added feature specifically designed for the elderly. Bathrooms will contain grab bars at the tube and water closet. Fixtures are arranged on both walls so that a clear aisle along the tub will be accessible to tenants confined to wheelchairs. The bathrooms will have non-skid floors.

Other safety features in the apartment design include windows with sash projecting into room for washing purposes, to eliminate the need to climb stools. Another design feature of the window prevents any possibility of falling out of the window.

Kitchen cabinets were also specially designed so that wall cabinets are lower, affording ease in reaching the upper shelves without climbing stools or step-ladders. Common building materials and a carefully studied color scheme were handled in such a manner throughout the project as to help create an attractive and inviting environment as opposed to the accustomed institutional character of public housing projects.

Structural

The structure is basically a two-column cantilever system using a 7-inch flat-plate reinforced concrete slab. The slab cantilevers beyond the columns to support the exterior wall. The need for a perimeter beam was thus eliminated and the number of columns and foundation reduced. A comparative analysis of the two-column cantilever system versus the typical columnar cage made by the architects and engineers, proved the cantilever system to be more economical.

Electrical

Apartments will have a master TV antenna system outlet in each living room. Lighting fixtures were carefully selected to be consistent with the architectural design. Walk and garden lighting is designed to provide a pleasant atmosphere for evening outdoor activities.

Heating and ventilating

The heating system consists of a two-pipe up-feed low-pressure vacuum-return steam system. Convector units are mounted to the curtain wall window panels and specially designed to prevent their becoming a hazardous element to elderly tenants.

All interior toilets are provided with special exhaust systems.

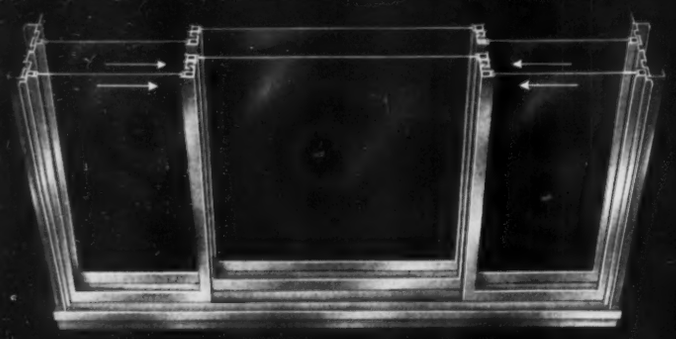
Plumbing and related information

Space behind base cabinets obtained by pulling them out to allow lowering of wall cabinets is utilized for concealed plumbing lines.

Costs

General construction	$530,000.
Plumbing	64,700.
Heating	45,000.
Electrical	42,000.
	$681,700

Eliminate cost of Insulating Glass



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1¾ inches of air space between glass provides superior insulation.

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Sliding Glass Doors
Jalousie Windows & Doors
Sliding Windows
Double Hung Windows

Circle 152 for further information

BOOKS

Ludwig Mies van der Rohe *by Arthur Drexler. New York: George Braziller, Inc., 1960. 127 pp., over 80 pp. of reproductions incl. photographs, plans and drawings, $3.95.*
Following the successful launching of "The Great American Artists Series" last fall, George Braziller is now publishing a new series on architecture—"The Masters of World Architecture"—the first six volumes of which have just been released.

The six books—each devoted to a master modern architect and his work—are: *Frank Lloyd Wright* by Vincent Scully, Jr., Associate Professor of History of Art at Yale; *Le Corbusier* by Francoise Choay, noted French art critic; *Pier Luigi Nervi* by Ada Louise Huxtable, commentator on architecture for *The New York Times* and contributing editor to *Progressive Architecture* magazine; *Antonio Gaudi* by George R. Collins, Associate Professor of Fine Arts, Columbia University; *Alvar Aalto* by Frederick Gutheim, author of numerous books on planning and architecture; and *Ludwig Mies van der Rohe* by Arthur Drexler, Director of the Department of Architecture at the Museum of Modern Art in New York.

The book on Mies, which is reviewed in this issue, is similar in format to those of the rest in the series. The publishers are to be commended for their program of publication of this series. There has been a long-standing need for low-priced books on architecture with authoritative texts. One cannot fail to be impressed with the excellence of the paper, the typography and the graphic layout. Each text contains a comprehensive bibliography, chronology, and index. The selection of Mr. Drexler to prepare the text on van der Rohe is a good one. As critic and curator of architecture at the Museum of Modern Art, he has been closely associated with the intellectual and artistic ferment pertinent to the work of Mies. Drexler knows his subject and projects it with interest and authority. There is a comprehensive exposition of the technological means which gave rise to the Miesian discipline. Together with others in the series, this book is recommended to architect and scholar—practitioner and student alike. This series will make an attractive, realistically-priced, and welcome addition to one's library shelf.

I would like to present one small reservation. It is not necessarily associated with the publication of this series. One wishes that somehow, publishers in this field would find the courage or the means to develop a similar series of monographs written to the layman (whomever *he* might be!) The Braziller series is splendid—but it will be most enjoyed by those with advanced appreciations and who are already psychologically and intellectually pre-disposed to the subject. It would be interesting to explore the possibility of "popularizing" architecture and architects. This could be accomplished, in my opinion, without a concomitant vulgarization of content. *JJC*

Elements of Reinforced Concrete *by Sylvan P. Stern. New York: Prentice-Hall, Inc., 1960. 448 pp., $8.25.*
Treats introductory and review material and develops elastic and plastic elements using step-by-step approach. Among subject matter are: stress and strain in homogenous beams; flexure formula; effects of internal stresses resulting from external shearing forces caused by one or more loads acting on a composite beam; diagonal tension stresses in reinforced concrete; web reinforcement; anchor bolts; spirally reinforced, tied, composite and combination columns; retaining walls in relation to lateral pressure; set of design computations for foundation of simple steel-framed building; and complete set of reinforced concrete detail drawings.

Engineering Education in Russia *by Stephen P. Timoshenko. New York: McGraw Hill Book Co., Inc., 1959. 47 pp., illus., $2.75.*
Informal and personalized account of history and development of Russian engineering education. Covers briefly organization of engineering schools, admission requirements, curricula, methods of teaching, programs and facilities for graduate work and training of research engineers.

Industrial Thermal Insulation; Materials, Application Methods, Specifications *by Allen C. Wilson. New York: McGraw-Hill Book Co., Inc., 1959. 295 pp., illus., $9.00.*
Practical treatment of thermal insulation for piping, equipment and structures used by American industry at temperatures above the boiling point of water to 2000°F. or below the freezing point of water. Useful reference aid for design and maintenance engineers.

(Continued on page 78)

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Design Ideas Fo
With L-M's New

LAWN-GLO FOR SUBDIVISIONS like this; for home estates, patios, specify the new L-M Lawn-Glo light. Mode in design, yet it harmonizes with either traditional or conter porary surroundings. This efficient unit is built to high quali

SWIMMING POOLS, LIKE THIS one at the attractive Leilani Motel, Milwaukee, are ideal locations for the Lawn-Glo light. It provides adequate light without glare, and greatly increases the hours in which the pool can be enjoyed.

THE LAWN-GLO IS front yards, drivewa the motorist sees the ing light. It provide adds value to the h

Lawn-Glo is one of the latest developments of Line Materi Industries, a leading manufacturer of a complete line of outdo lighting. L-M designs equipment for streets, airports, parkir areas, shopping centers. Special units are available for parks ar recreation centers, hotel and motel grounds—everything fro patios to super-highways. L-M also offers custom design servi

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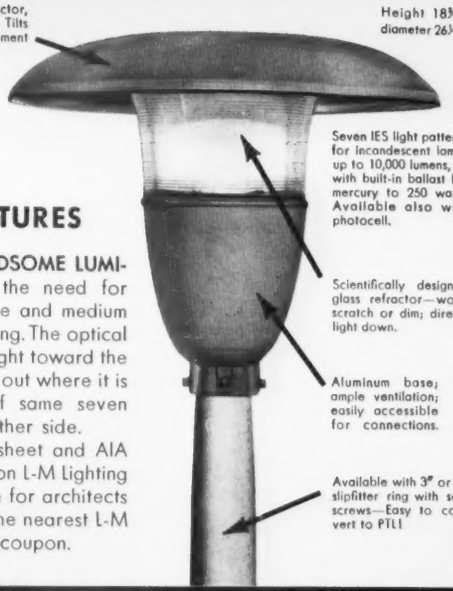
Spun aluminum reflector, in choice of colors. Tilts up for lamp replacement or cleaning.
Height 18¾"; diameter 26½".
Seven IES light patterns for incandescent lamps up to 10,000 lumens, or with built-in ballast for mercury to 250 watts. Available also with photocell.
Scientifically designed glass refractor—won't scratch or dim; directs light down.
Aluminum base; ample ventilation; easily accessible for connections.
Available with 3" or 7" slipfitter ring with setscrews—Easy to convert to PTL!

PTL FEATURES

THE PTL IS A HANDSOME LUMINAIRE that meets the need for daytime appearance and medium level nighttime lighting. The optical system directs the light toward the ground, not up and out where it is wasted. Choice of same seven colors shown on other side.

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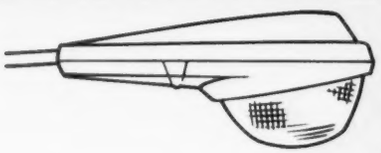
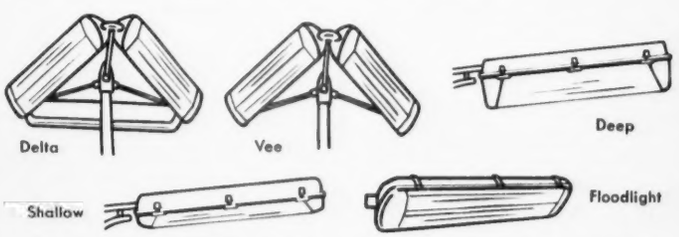
SOME OTHER L-M OUTDOOR LIGHTING

SUBURBANAIRE: Highly efficient reflector with open-type glass refractor; high light level with minimum maintenance. For streets, parks, farmyards, shopping centers, parking lots. Seven IES light patterns; mercury or incandescent; photocell available.



OVALITE: New mercury unit with self-contained ballast. Three light patterns; adjustable for high or low angle. For high intensity illumination of highways, toll gates, parking areas and roadways, streets, plants, railroad platforms and yards.



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In Canada: CLM Industries, McGraw-Edison Canada Ltd., Toronto 13, Canada

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and name of nearest distributor
☐ Please have your lighting engineer contact me.

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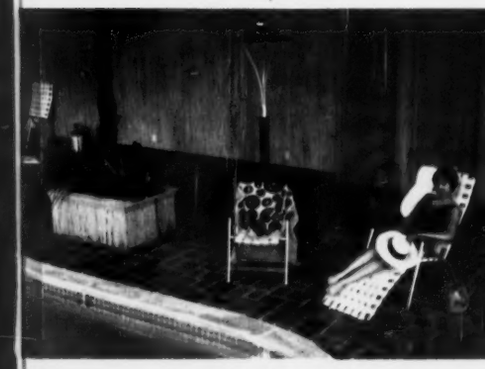

SWIMMING POOLS, LIKE THIS one at the attra tive Leilani Motel, Milwaukee, are ideal locatio for the Lawn-Glo light. It provides adequate lig without glare, and greatly increases the hours which the pool can be enjoyed.

Lawn-Glo is one of the latest develo Industries, a leading manufacturer of a lighting. L-M designs equipment for areas, shopping centers. Special units recreation centers, hotel and motel g patios to super-highways. L-M also o

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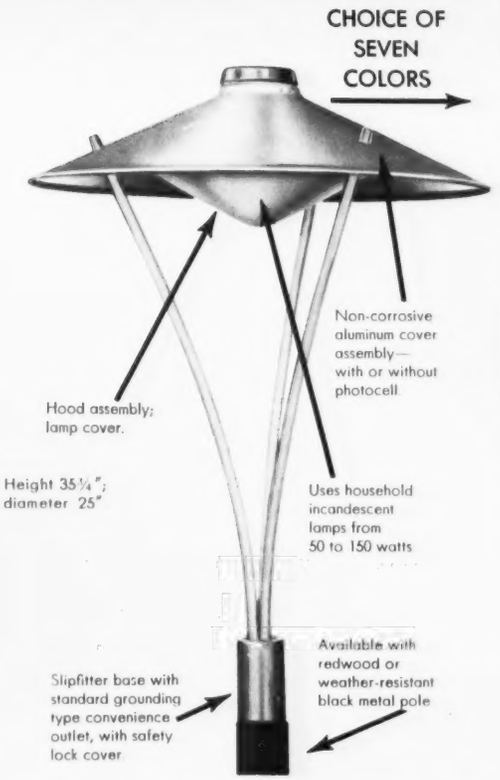
LAWN-GLO FEATURES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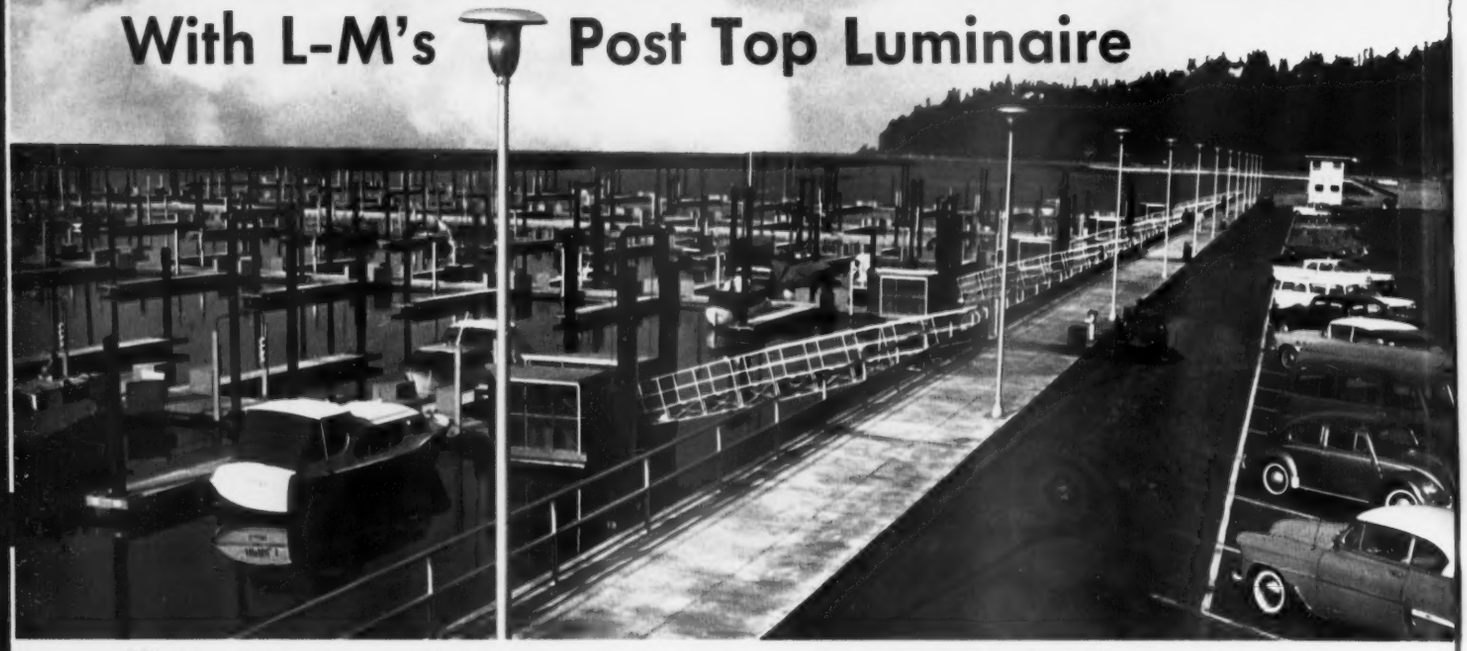

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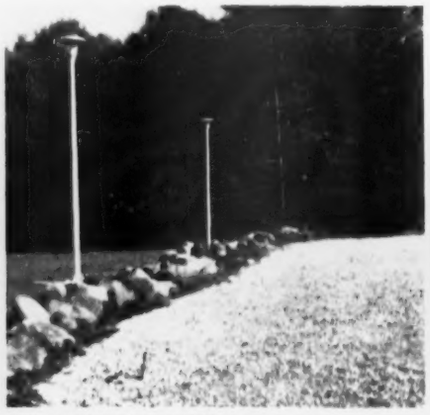

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ABSTRACTS

THE NEXT DECADE IN BUILDING

From a talk by Vincent G. Kling, FAIA, delivered at the eighth annual meeting of the Building Research Institute. Mr. Kling has been elected as Fellow of the American Institute of Architects.

"There are several avenues open to anyone who sets himself up as a prognosticator. He can describe the present and future in terms of conflicts and problems to be solved, or he can steer his thoughts by hopeful signs and fashion a wonderful fantasy of life as we might wish it to be.

"The course I plan to take with my crystal ball today lies, I hope, somewhere between these two. But I mention the extremes for this reason. In this pragmatic society, where ingenuity is a point of national pride, we are all apt to dismiss dreaming as the easy road, and pay our respect to the so-called practical mind that concerns itself with solving difficult problems. In truth, I think the reverse is true. Dreaming—deciding what we like and what we *want*—flexing our imagination—is the toughest mental discipline there is. Diagnosing problems, eliminating the negative, is simple by comparison. It is, for example, much easier to catalogue the things we dislike about city living—the noise, the dirt, congestion, traffic jams, overcrowded facilities, slums—than to pinpoint those precious values that keep us in the city or keep drawing us back to it. Yet now, with the tools of urban redevelopment, we have an unprecedented opportunity to dream, and refashion cities as we *want* them to be. And knowing what we want to eliminate is not enough, as too many of our redevelopment plans already demonstrate.

"The same thing is true for building design. It is so easy to approach it in terms of problem solving; to make a virtue of accommodating a host of restrictions. But buildings designed in this fashion seldom rise to the level of architecture. For architecture, that mysterious ingredient that endows a building with spirit, follows from something positive to be said, not merely from the resolution of conflicts. A work of architecture is a statement, not *just* a solution. Perhaps the hardest task we face, in the years of building ahead, is the one we all share of deciding what we want our buildings to say—to us and about us.

"This observation is borne out to me by my recent experience on two architectural juries, one for the annual *School Executive* competition for better school design; the other for the A.I.A. national honors awards program. Of a total of some 500 entries that my various colleagues and I reviewed in both judgments, we were impressed with the great number of them that demonstrated workmanlike solutions to problems, and the few of them that had anything special to say. Perhaps I might stop for a minute and elaborate further on qualities of the dozen or so buildings that seemed to us outstanding.

"At first acquaintance, they conveyed a 'message.' You could respond to them immediately; you did not have to read the program and the budget to understand and appreciate them as solutions to problems.

"Moreover, they looked like what they were supposed to be doing. Schools looked as if they would be good houses for an educational program, not like factories. Churches looked like houses of God, not extroverted exercises in *tour de force* roofing. Dormitories looked like places for people of like interests to sleep, study, and play; not like lace-covered candy boxes.

"Second, these buildings had a human quality in their scale, in the logical use of warm, personable materials, and their respect for their neighbors and natural environment. They could be big without being overpowering; they could be modern and new without being slick and shiny. They used a balanced vocabulary of old and new materials.

"Third, the quality of architecture that characterized them all was never a matter of accident or external applications; the major idea of theme was expressed by the masses and spaces they created, then infinitely refined through the harmonious execution of details. The prize entries had originality both in brilliant functional schemes and forms of expression.

"Finally, they were joyful in spirit and provided, as the mother art should, a happy home for the other arts.

"These, of course, are general qualities of good buildings in any age; they would be as applicable in ancient Greece or Colonial America as they are now. And as in any age, they characterize the exceptions rather than the general run of buildings. But they remain the goals for all of us who are involved in the business of creating buildings, and the difficulty of realizing them varies with changing conditions.

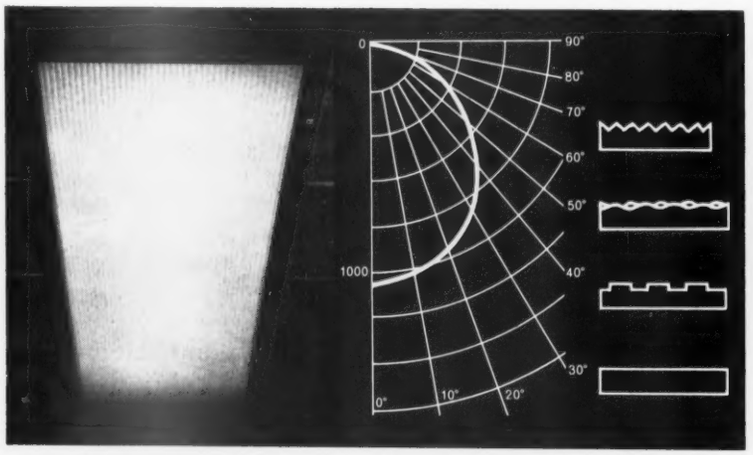
"Having sketched the goals, I would like to talk about some of the conditions that work for and against their realization.

"Let's start our investigation with a review of our new building of the last two decades, the familiar post-war building boom. Surprisingly enough, this represents almost the entire life span of modern architecture in this country. It isn't much older, I know.

"I can remember how thrilled I was back in 1944—not so long ago—to have my first building chosen for the Museum of Modern Art's first major exhibit on contemporary American architecture. It was a house, as were, I recall, most of the examples in that show.

"What we are apt to see in a quick glance over this period is an endless succession of grid-enclosed prisms. But let's put this view aside for the moment and look closer. What we find in these buildings is new concern for interior space. Ours has been a generation of architects and builders concerned as never before with the control—I might say engineering—of 'atmosphere,' motion, sound, light, temperature and humidity. We have learned how to stretch space upward with elevators, outwards with glass; how to reshape it with color and

(Continued on page 70)



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ABSTRACTS

(Continued from page 69)

sound; how to make day and night, summer and winter inside a single enclosure. This emphasis on space engineering is borne out by the ledger. Before the second world war, the portion of the average building budget spent for mechanical equipment engineering controls was under 25 per cent. Today, we are doing well if the mechanical equipment doesn't eat up more than 35 per cent of the building budget.

"All this has been accomplished in the name of greater comfort, but not without its price. Art has in great measure been traded off for technology. And what is the toll in human terms? How are we affected, day in and day out, by the synthetic atmosphere that surrounds so much of our activity? What happens to our eyes and perception, for instance, in rooms flooded with fluorescent light? Can our continued response to fluorescent tubes at 60 foot candles bridge the gap between fire light and sunlight: What are the combustion gases and by-products of man-made heating and power systems doing to our olfactory senses and respiratory systems?

"I raise these questions to suggest a whole range of exploration beyond the boundaries of technical research. The technical job, of course, is never finished; we reduce the heat with air-conditioning and then we must figure how to reduce the noise of the compressors. Beyond this is the area where the behavioral sciences must operate, to help us discover more about human responses to the environments we create. The steady speed-up of the building process makes this even more urgent, for it leaves us, the architects and technicians, with too little time to evaluate the finished job before we start the new.

"Of course, we cannot talk about space without talking about the structures and inclosures that define it. I have already referred to the grid-inclosed prism, for certainly this, more than any other type of building, has become the badge of the postwar building era. Its very popularity has been its undoing. What began as a fresh sight for eyes weary of a meaningless miscellany of eclectic styles has, by the process of endless multiplication, produced a new kind of eyesore. The search for relief has already begun . . .

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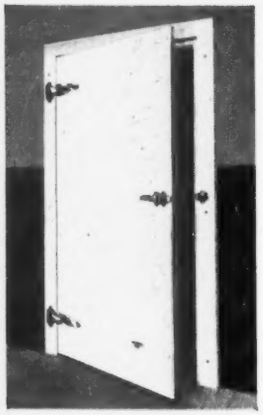

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relationships. Structure assumes new importance in the search for a breakthrough of the sheer surface. Plasticity is the new goal. In its service, we shall see the greater use of tension rings; hyperbolic paraboloids; thin-shell concrete spans; pre-cast, pre-stressed, and post-stressed concrete members; geodesic domes and laminated timber.

"New forms will demand new materials and subject familiar ones to a whole new set of requirements. The field for synthetics will continue to broaden. By this, I don't mean to suggest that we are headed in the direction of the plastic house at Disneyland. Quite to the contrary. Part of the reaction we are now experiencing to the curtainwall prisms is a protest against the vocabulary of cold slick materials, against interiors that depend entirely for life and warmth on the presence of a few potted plants. Look at the Lustrom home of the 40's, an achievement in technology, economy and utility—but a failure because of a noisy, harsh metallic quality that alienated people.

"By their very limitations, these experiments point the way for research in plastics, metals, and synthetic fibres. What we need so desperately are man-made materials that will give the advantage of economy and speed of erection, and at the same time will give us flat, non-shiny surfaces, friendly textures, lasting color, moldability, and the ability to grow old gracefully. This last is most important. We need a structural member—other than masonry—that can be integrated with the skin and withstand the torments of weathering without alienating our aesthetic sensibilities.

"I will admit that the picture I have painted up till this point is largely the work of my left hand, the dreamer. . . . I am not unaware, when I deplore the overuse of the curtainwall prism and lament the sterilization of interior space, that these conditions follow from very real needs. One is economy, one is space conservation, one is speed of accomplishment.

"This brings me to what I have, for want of a better term, referred to as the 'external' forces that shape our buildings. For a full and brilliant discussion of them I refer you to *The Exploding Metropolis* by the editors of *Fortune magazine*. Right now, a few statistical projections will serve my point.

"Our populations experts tell us that, short of global war, we can anticipate in the next decade a 27 per cent increase in the number of households nationwide, from the present level of 48 million to 61 million in 1970. In the same period, college enrollments will double—from 3.5 million to 7 million students. And by 1970, the number of cars on the road will rise 55 per cent to a staggering total of 90 million!

"With such dramatic and rapid population growth ahead of us, we can hardly expect any let-up in the pace of building and in the pressure for speedy construction methods. At the same time, the pressure for economy will mount, in the face of other demands on the family, corporate, and national income. Studies show that even now, a considerable number of families are spending more of their annual income on transportation than they are spending for shelter. Federal appropriations for highway construction are currently running more than 20 times larger than for urban renewal. And we haven't yet begun to bail out the commuter railroads.

"Add to these prospects the consequences of a heightened competition among housing, industry and cars for that most precious of all resources, *land*. There just isn't enough open space in suburbia to continue indefinitely our present pattern of development of single-family houses, sprawling industry, park-and-shop centers and limited access highways.

"In the face of these portents, will we be able to extend the horizons of architecture, or will the current changes amount to no more than a palace revolution? Will there be space enough to permit the greater freedom of form we are seeking, money enough to restore the fine arts to their proper role? Will our bold new designs be obscured in a sea of parked cars, reduced to boredom by endless multiplication, or cramped by uncongenial neighbors?

"The answer lies largely in how well we plan. By 'we' I do not mean just architects or technicians, but all of us who live in cities or outside them. And by planning I do not mean accommodating extrapolations. I mean deciding what we *want* our communities and buildings to be and do for us, and mapping out a way to achieve these ends. To do this, we will have to get over the silly notion that planning is destructive of free enterprise. It isn't. It is the difference between one person winning, and everybody winning."

DRAFTING TRENDS

Inspecting the "locked-in" black image of POST *208TC, Vapo Tracing Cloth, are Mort Fishman of Sabatino & Fishman, Architects, and Mike Ceglia of Bernard Sacks & Associates. Mike Conlin, sales representative of local* POST *dealer, Philadelphia Blueprint Company, looks on.*

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EDITORIAL

EXPANDING HORIZONS This is the theme of the 1960 convention of The American Institute of Architects meeting at San Francisco this month. The worlds of technology, sociology, politics and economy and philosophy will be explored by outstanding authorities as the architect-conferees try to assess the measure and character of things to come. In a civilization undergoing rapid change, mankind is called upon to utilize new resources and discoveries in years—where heretofore it had centuries in which to accomplish its tasks. Therefore, the events of contemporary history are thrust upon us. We cannot choose the exact time and place. At best, we can formulate a reasonable and intelligent judgment whereby we may adapt ourselves, as architects and citizens, to the complexities of a universe in dynamic flux.

Recognition of this condition of life and the architect's role within its structure was given profound expression in an AIA-NSF conference given at Ann Arbor, Michigan under the direction of the national AIA Committee on Research for Architecture. An emphasis was made on the *social* role of the architect—that is, in the vernacular of the communications industry, the "public image" of the architect. From a reading of the proceedings, one gains the understanding that leading members of our profession are aware of the need for a redefinition of what architectural practice is today and what it must become tomorrow.

Herbert H. Swinburne, AIA, of Philadelphia, speaking on "Architecture—a Re-definition" stated, "The role of the architect will be to give that leadership which will create a vital quality that we can only describe as 'dynamics of atmosphere'—a sense of destiny, a feeling of people on the move, a knowledge that we are realizing goals that will form a better society."

The need for this extension—this *projection*—if you will—of the architect's professional value as a citizen in the larger affairs of the community is re-echoed by Bertrand Russell, the eminent British philosopher, in a recent speech given before a distinguished body of British scientists:

"Modern democracy and modern methods of publicity have made the problem of affecting public opinion quite different from what it used to be. The knowledge that the public possesses on any important issue is derived from vast and powerful organizations: the press, radio, and above all, television. . . . It is impossible in the modern world for a man of science to say with any honesty, 'My business is to provide knowledge, and what use is made of the knowledge is not my responsibility.' The knowledge that a man of science provides may fall into the hands of men or institutions devoted to utterly unworthy objects. I do not suggest that a man of science, or even a large body of men can altogether prevent this, but they can distinguish the magnitude of the evil."

Men of many professional specializations echo this theme everywhere. By extension of Lord Russell's comment, one could assume that the architect must accept a measure of the responsibility for "diminishing the magnitude of the evil," in those areas which affect our urban culture—our homes, streets, schools, libraries, theaters, universities, churches, laboratories and factories. In short, a greater responsibility for those areas of public concern which affect the creation of human environment.

One month, before his death, Frank Lloyd Wright stated it most eloquently, "The architect is the natural interpretor in terms of structure of whatever *is for his people.*"

Is for his people—a profound idea abstracted in four simple words. The architest, among many other disciplines, is emerging from the parochial, self-defensive isolation characteristic of the past.

This convention at San Francisco seeks the larger and more fundamental knowledges and patterns that will make the architect a more effective, richer instrument of his time. This exploration—this adventure for an expanding horizon is not only a praiseworthy program. It is a crossroads in the history of our profession—a reflection of an awareness that architects can no longer shirk the responsibility for the attitudes of society and for the use society makes of his talents, his discoveries and his professional life. *JJC*

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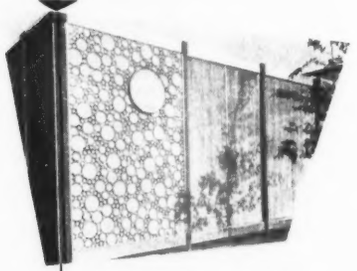

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DIGEST:16

NBS RESEARCH ON THE MECHANICAL PROPERTIES OF METALS

A/E NEWS presents a summary of a technical report issued by the NBS Office of Technical Information, U. S. Department of Commerce, National Bureau of Standards, Washington 25, D. C.

To improve the performance of metals and to develop new alloys as they are required by science and technology, a better understanding is needed of the relation of metallurgical structure to the behavior of metals and of the effects of heat treatment and temperature extremes on this relation. To provide such information, the National Bureau of Standards has accelerated its research program on the mechanical properties of metals. The reactions of both conventional metals and super-alloys are observed over a wide range of environmental conditions. Micro-scopic, X-ray diffraction, and induction furnace techniques are used to discover how relatively small changes in lattice structure affect the tensile and yield strengths, ductility, hardness, and other properties of metals that make them unique construction materials. The results of this effort are expected to increase knowledge of the fundamental laws governing the performance of metals and thus promote their more effective use.

Today, metals are more important to scientific and engineering progress than at any time in history. They have become irreplaceable construction materials of a modern civilization. Mechanical properties such as strength and stiffness permit them to be machined, welded, rolled, pressed, drawn, or bent into any desired form. Because of their resilience and toughness, they yield without fracture to shock and vibration. These and similar qualities have achieved for metals a foremost place in the ranks of industrially useful materials. Nevertheless, if metals are to keep pace with contemporary and future technological advances, a better understanding is needed of metallurgical structure, and of the influences of heat treatment and of temperature extremes on this structure.

To provide data that will assist in meeting this need, the National Bureau of Standards has accelerated its program of fundamental research on the mechanical properties of metals. Instabilities in alloys, changes within the space lattice at the atomic level, surface reactions, the creep process, metal fatigue, all of the factors controlling the response of metals to external forces, are being investigated in this effort. It is hoped that from information derived experimentally, practical methods will be devised for improving the performance of metals, and for developing new alloys as they are required by scientists and engineers. To this end, the work on mechanical properties of metals is closely coordinated with concurrent Bureau programs in metal physics, chemical metallurgy, and corrosion.

Metallurgical structure

Metal fatigue is the most common cause of mechanical failures in service. This phenomenon may occur in any component or machine part subjected to fluctuating or repeated stresses, sometimes even after many millions of cycles of stress. Hence, much consideration is given to engineering design to increase the useful life of metal parts; for instance, in the aircraft industry where the effects of vibrations and other sources of repeated stress must be taken into account. However, in order to achieve optimum design, engineers must be able to predict the behavior of stressed components with a high degree of accuracy, and this ability requires an understanding of the relation between the structure of metals and the fatigue process.

It is well known that fatigue cracks generally start on pre-existing slip bands within the grains of a metal. However, to study the conditions under which cracks start in commercial metals is difficult, principally because these metals are composed of a large number of infinitely small grains. The Bureau has therefore produced aluminum specimens with grains 2 to 3 mm in diameter, so that the behavior of individual stressed grains could be observed more readily.

In one study with these specimens, individual grains were found to act independently of their neighbors. There was no evidence that grain boundaries or interaction with neighboring grains promote cracking. It appeared that the principal factor to be considered in the fatigue-crack initiation of polycrystalline aluminum is the resolved shear stress on the plane of easy slip in the slip direction.[1] This study was sponsored by the National Advisory Committee for Aeronautics, now the National Aeronautical and Space Administration.

Results of another study sponsored by this agency showed that the preponderance of fatigue cracks starting at the edges of a metal specimen is caused by the stress pattern, rather than by lower fatigue strength at the edges.[2] In its work on metal fatigue, the Bureau has made a study of the factors that influence the fatigue strength of spring wire. The results of this work, which has been carried on under the auspices of the Army Ordnance Corps, should be of value in efforts to improve the performance and relibility of the springs used in ordnance devices.[3]

Chemical reactions at the metal surface are known to have an important influence on fatigue behavior. It has recently been observed that if transparent tape is applied to the surface of a fatigue specimen, bubbles form under the tape at about the same time that fatigue cracks are initiated. These bubbles, caused by gas liber-

ated as a result of surface reactions, are expected to provide a useful means for studying such reactions.[4]

For several years, X-ray diffraction techniques have been used at the Bureau to determine stresses that occur within a metal's structure. With these techniques, the lattice strain can be ascertained by measuring changes in interatomic spacing. Because of its selectivity and directionality, X-ray diffraction has advantages over other means for evaluating stresses.

In a recent study with iron specimens in which these techniques were used, it was found that plastic deformation of this metal causes residual stresses to develop on a microscopic scale.[5] An investigation of the elastic and plastic behavior of the ferrite lattice in a low-alloy steel showed that the stresses observed by X-ray diffraction exist in a relatively undistorted crystalline material. These stresses were balanced by oppositely directed stresses, either in distorted portions of the crystals adjacent to grain boundaries or in slip bands.[6]

In two-phase alloys the thermal expansion coefficients of the two phases usually differ. Consequently, there is a tendency toward unequal changes in the volume of each phase as the metal cools from the liquid state. The unequal volume changes cause intergranular forces to arise which are known as textural stresses. These stresses are to be distinguished from the other kind of internal stresses occurring in metals known as body stresses.[7]

In Bureau experiments it was possible to measure these textural stresses by X-ray diffraction. Results indicated that a completely stress-free condition cannot be obtained in metals that have more than one phase. Textural stresses must therefore be considered in investigations to determine the causes of corrosion, metal fatigue, and crack formations in metals used for industrial purposes.[8]

Effects of high and low temperatures

The changes that metals undergo at high temperatures are becoming more and more important to the development of rocket machinery and astronautical devices. To a somewhat lesser degree, the effects of very low temperatures on the mechanisms of deformation and fracture of metals are of concern. As new test methods are devised, investigations of high-purity metals and the new alloys are proceeding under both types of environmental conditions.

Titanium and its alloys, because of their high strength-to-density ratios and high resistance to corrosion, are promising materials for many cryogenic applications and for certain aircraft and missile components.

Since 1949 the Bureau has been studying the mechanical and thermal properties of this comparatively new metal, as a part of its comprehensive program on the deformation of metals. In early studies for the Army Ordnance Corps the effects of temperature were correlated with the tensile and impact properties and the true-stress-true-strain relations for an annealed commercially pure titanium.[9]

It is necessary to know how titanium and its alloys react at low temperatures under both uniaxial and multiaxial tensions in order to understand their rheological behavior. Several investigations were therefore conducted at temperatures down to −196°C to evaluate the combined influence of prior strain-temperature history and notch geometry on the tensile behavior of commercially pure titanium and a titanium alloy containing aluminum and manganese. Notch geometry is significant because brittle failures at low temperatures are often associated with the presence of a notch, either as a design feature or as a defect. Measurements of strength and ductility characteristics disclosed that strength indices—that is, resistance to flow, notch strength, true stress at maximum load, and fracture stress—are generally increased, and tensile ductility is decreased, by increasing the notch depth or by lowering the test temperature. Analysis of the data indicate that these metals are very notch sensitive, particularly at low temperatures. The decrease in ductility with increase in depth and sharpness of notch is attributed not only to the initial stress concentration and accompanying severe strain hardening of the metal at the root of the notch, but also to the triaxial stress system induced by the notch. In general, the embrittling effect associated with the stress concentration was somewhat greater than that caused by triaxiality of the stress system. The results emphasize the importance of taking special care to eliminate notches. If they are unavoidable, their embrittling effect should be minimized by designing notches with the largest possible root radius.[10]

It is fairly well accepted that the rate-determining factor during creep of metals is the motion of defects through the crystal lattice by thermal activation under applied stress. However, of the numerous equations proposed to describe this behavior, none has been found completely satisfactory. To provide basic information that will assist in forming a theory to explain the structural changes that occur during creep, the Bureau has been conducting a long-range program. In the most recent study, tests were made at temperatures up to 1,200°F. The influence of stress, strain rate, and prior strain history on the mechanism of creep, and on the flow and fracture characteristics of high-purity nickel and copper and their alloys was determined.

The results conform closely to the concept of generation and exhaustion of lattice defects during the first stage of creep, as well as to the parabolic strain-time law over limited ranges of stress and strain during the second stage. It was found that the resistance to creep is materially increased by alloying the component metals and also by cold-drawing, provided the creep temperature is below the recrystallization temperature range. The increase in creep resistance by cold-drawing is accompanied by a corresponding decrease in ductility, which is also effected by temperature and strain rate.[11]

Among studies presently under way is one using electron microscopy and diffraction to determine the mechanism of hardening of the precipitation-hardening stainless steels, and to establish the relationships between heat-treating variables and the microstructure of metals. These techniques are also being used to investigate the mechanism and kinetics of phase transformations, and the structure of metal oxide films.

High-strength steels

The fatigue strength of most ferrous metals is roughly proportional to the tensile strength. But when steels are heat-treated to high hardness, this proportionality disappears, and with increases in tensile strength to above 200,000 psi, there is little improvement in fatigue strength. In an effort to resolve some of the conflicting views concerning the influence of a number of metallurgical variables on this behavior, the Bureau recently conducted experiments on several high-strength steels.[12]

The study disclosed that retained austenite lowers fatigue strength. Austenite is the face-centered cubic form of iron that exists in steel at high temperatures. Under stress, retained austenite is transformed to untempered martensite, which probably accounts for the deleterious effect. With suitable heat treatment, however, retained austenite can be eliminated in most carbon and low-alloy steels. The results of this research are expected to have practical applications in the choice of industrial steels.

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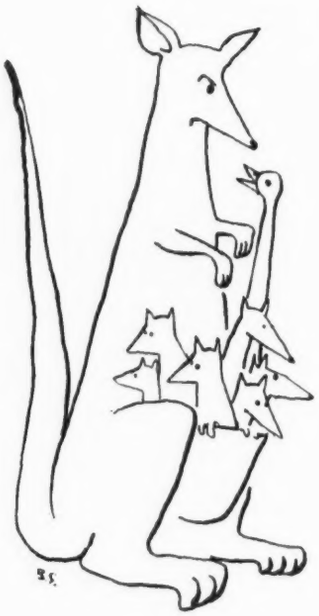

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(Continued from page 64)

DOCUMENTS

The documents listed below are available through the associations and agencies cited. All orders should be directed accordingly.

National Electrical Manufacturers Assn., *155 E. 44th St., New York 17, N. Y.*

NEMA Standard for Low-voltage Cartridge Fuses, *FU 1-1959. $.70.*
Covers rating, performance, characteristics and manufacturing of Class H, J, L and M low-voltage cartridge fuses rated at 600 volts or less, ac and/or dc.

NEMA Standard on Characteristics of Apparatus Insulators, *HV 1-1959. $.25.*
Characteristics given on cap-, pin- and post-type apparatus insulators.

Installation of Vertical Hydraulic-turbine-driven Generators, *LG 3-1959. $2.00.*
Intended as a guide in the installation of such generators. It covers tools and facilities, personnel, generator construction, alignment of generator and turbine shafts, installation precautions, receiving, storage, unpacking, and erection procedures.

Wiring Devices, *WD 2-1959. $.20.*
Essential dimensions of the lamp shoulder gauge for medium base lamps and the colors of molded compounds for wiring devices covered.

X-Ray Equipment, *XR 2-1959. $.30.*
These standards deal with: sizes of cassettes; X-ray tube focal spot size; and direction of fluoroscopic diaphragm operating means.

Vinyl-acetal-coated Magnet Wire, *MW 15-1959. $.30.*

Vinyl-acetal Nylon Coated Magnet Wire, *MW 17-1959. $.30.*

Vinyl-acetal Self-bonding Magnet Wire, *MW 19-1959. $.30.*

Power Switchgear Assemblies, *SG 5-1959. $4.00.*
Information given for temperature rise, ratings, current transformer accuracies, design, production and field tests, finish, nameplate information, connections, enclosures, application, abbreviations, device numbers and symbols. Section devoted to the standard equipment for three-phase, three-wire circuits.

DIGEST:16

The Bureau's thermal metallurgy laboratory has recently been engaged in developing an ultra high-strength steel for the Navy Bureau of Aeronautics. By modifying Type 4340 steel an alloy was found that had high hardenability, sufficient ductility for use as structural members in aircraft, and a tensile strength up to 300,000 psi. Although these properties were obtained in laboratory induction furnace heats, melted without slag they may be duplicated or even improved upon in commercial practice.[13]

Mechanical failure of metals

For many years the Bureau has examined metal parts that have failed in service to obtain evidence bearing on the causes of failure. These examinations have been undertaken for other Government agencies such as the Ship Structure Committee of the National Research Council, the Civil Aeronautics Board, and the Defense Department.

From 1942 to 1953 an extensive study was made of steel plates from more than 100 merchant vessels that had fractured while in use. The results of this work showed that the performance of a steel in service can be correlated with the mechanical properties as measured in the laboratory. The information thus derived has provided much of the basis for the current specifications for ship plate.[14]

Investigations for the Civil Aeronautics Board and defense agencies have often had a bearing on decisions regarding the safety of transport aircraft, particularly with regard to correcting conditions that have led to accidents. Laboratory work includes examination of the failed parts by visual, microscopic, and metallographic methods, as well as mechanical and chemical tests. Data have been compiled on the circumstances of the failure, together with factors indicating errors in design, in material selection, and in fabrication.[15]

Gage block stability

For a number of industrial processes as, for example, in the making of machine tools, ball bearings, and missile guidance mechanisms, test gages for dimensional control must be very precise; and the gage blocks used in checking the accuracy of these gages must be even more accurate. At present the Bureau regularly calibrates master gage blocks to an accuracy of 1 part in 1 million, that is, to the nearest millionth of an inch for inch-long blocks, and a goal has been set to increase this accuracy by a factor of ten. As part of this program, partially supported by several industrial firms, extremely stable materials are being sought for gage block construction, so that measured lengths will not change appreciably with time.

From recent experiments, nitrided 410 stainless steel appears to be a promising material for ultra-precise gage blocks. Specimens were found to be corrosion-resistant, and can be finished to a high degree of smoothness, flatness, and parallelism. Measurements thus far indicate that these specimens have the required dimensional stability. However, evaluations will continue for an extended period, since previous observations of commercial blocks have shown that the results of measurement over a year or two are not necessarily indicative of future behavior.

Looking ahead to the metallurgical requirements of a space age, the Bureau expects to place increasing emphasis on the study of all aspects of atomic structure that influence the behavior of metals in service. At present, techniques are being developed to obtain basic data that may point the way to new uses for metals. Ultimately this work may lead to new alloys that will withstand the most rigorous of environmental physical conditions.

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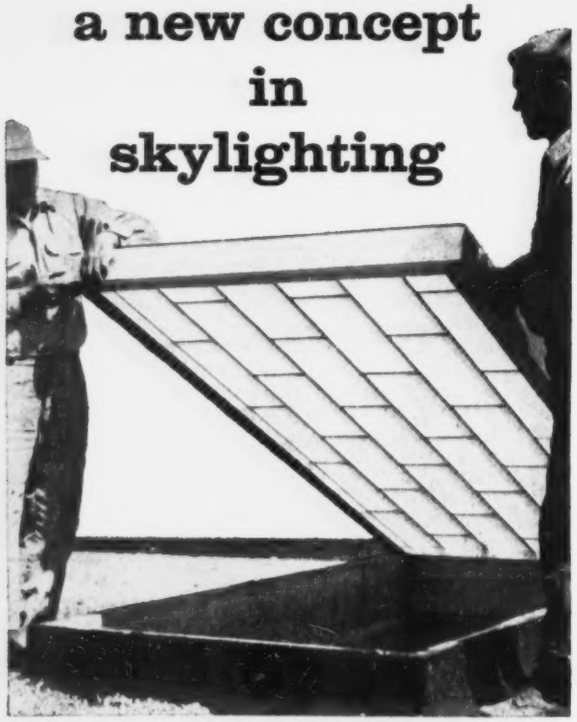

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NAMES

LUDWIG MIES VAN DER ROHE, FAIA. Known colloquially as "Mies", this world-famous architect and retired director of the Department of Architecture and City Planning at The Illinois Institute of Technology, has been elected to receive the highest honor of The American Institute of Architects—the coveted *Gold Medal* for 1960. Mies van der Rohe was elected for this honor by the AIA board of directors at the Octagon headquarters in Washington, D.C. He will receive the award at the annual dinner of the AIA convention in San Francisco on April 21, 1960.

Born in Aachen, Germany in 1886, where his father was a mason and operated a small stone-cutting shop, Mies, as a young boy, learned the rudiments and craft of masonry construction. To the astonishment of many people today, Mies has never received any formal architectural education. His experience has been gained empirically—first as an apprenticed draftsman and designer of classical stucco ornamentation in local architectural offices. From there, to Berlin where he, like two other world-famous architects, Walter Gropius and Le Corbusier, apprenticed in the offices of Peter Behrens. In 1912, he opened his own architectural office from whose drafting boards came his first building, the Kroeller house at The Hague, Holland. It caused a sensation in the world of architectural design due to its stark, classical simplicity.

After the first World War, Mies, now associated with the avant-garde movements in art and literature, emerged as a dynamic and strikingly original architect. His skyscraper projects of the early '20s emphasized the geometric uses of new technological means—glass, concrete and steel. An aesthetic expression was sought in these materials that was based entirely on an absolute resolution of their inherent properties and structural uses for architectural forms. His projects were daring then, and they still retain, after almost 40 years, a freshness and contemporaneous quality which characterizes current architecture. His absolute aesthetic—a simonpureness, if you will—in the use of steel and glass has attracted many architects in the United States and abroad in an emulation of his disciplines for their structures.

As an official of the *Deutscher Werkbund*, he directed the important Stuttgart Exposition in 1927, in which the most notable European architects participated. His German Pavilion for the Barcelona Exposition of 1929 would have assured him a place of lasting architectural fame—even if he had never created another building. Only photographs of this pavilion remain. From them we see the exquisite detailing and the precise elegance of rich materials—marble, stainless steel, glass—all used in a neo-classical composition of simple vertical surfaces and horizontal planes. Here too, Mies liberated the skin

of the building from its cage. His wall surfaces are either retained behind the structure or are moved past it to extend the spaces in heretofore unrealized architectural relationships.

In 1930, he was appointed director of the world-famous, experimental school of the *Bauhaus*. This was to be short-lived. Three years later, the *Bauhaus* at Dessau was forced to close because of political pressure brought to bear upon the institution due to the totalitarian cultural climate, then prevailing, in Germany.

Emigrating to the United States in 1938, van der Rohe was appointed Director of Architecture at Armour Institute (later the Illinois Institute of Technology) in Chicago.

In the United States, a significant following for his ideas has been promulgated over the past two decades. The past 15 years have seen the emergence of an architectural philosophy and practice, based on his precepts, which have made authoritative use of the vast technological means inherent in the American building industry. Van der Rohe's best-known and most recent building in America is the Seagram House at 375 Park Avenue in New York City. In 1959, he received the *Gold Medal* of the Royal Institute of British Architects. This year, apart from the AIA *Gold Medal*, he has been awarded, together with his professional colleagues, the *Gold Medal for Architecture* of the Architectural League of NY.

The editors of A/E News wish to take this opportunity to congratulate Mies van der Rohe on the occasion of his award of the *Gold Medal* and to warmly wish him many more splendid years of creative fulfillment and productive life.

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Plate No. 1091

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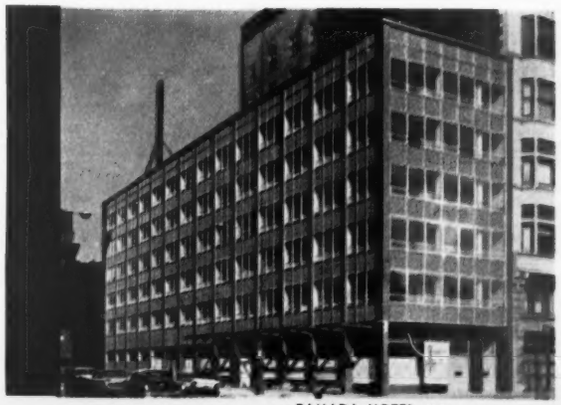

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(Continued from page 66)

Aluminum Construction Manual *by The Aluminum Assn. New York: The Aluminum Assn., 1959. 389 pp., illus., $3.09.*

Reference manual covers important structural uses of aluminum. Data, presented in tabular form, covers: aluminum structural shapes standard tolerances, miscellaneous data for designing and estimating; estimating and detailing information; allowable loads on 6061-T6 beams and columns; standards and specifications; and miscellaneous data, including effect of elevated temperatures on aluminum, conversion factors and index. Should be of interest to architects, engineers, structural designers and students.

Primer of Lamps and Lighting *by Willard Allphin. Philadephia: Chilton Co., Book Div., 1959. 241 pp., illus., $10.00.*

Simply and clearly written, text is comprehensive enough as guide to those who need to know lighting fixtures work. Numerous diagrams illustrate various lighting problems. Drawings, photographs and tables are notable.

Encyclopedic Dictionary of Electronics and Nuclear Engineering *by Dr. Robert I. Sarbacher. New York: Prentice-Hall, Inc., 1959. 1400 pp., illus. $35.00.*

Reference work, designed to serve as a central source for the standard definitions approved by every official technical society; intended to be of use to wide spectrum of scientific and industrial technicians and experts. Modern terms and definitions, equipments, components and systems in the electronics and nuclear engineering fields are covered in alphabetical order. Cross-references are incorporated.

Non-Newtonian Fluids, *Fluid Mechanics, Mixing and Heat Transfer by W. L. Wilkinson. New York: Pergamon Press, Inc., 1959. 150 pp., $6.00.*

Written for reader familiar with the engineering applications of fluid mechanics and heat transfer as applied to Newtonian systems. Discusses properties of so-called non-Newtonian fluids with special reference to the design and operation of the process equipment in which they are handled. Various types of fluid are described and experimental methods of characterization discussed.

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Fundamentals of Stress Analysis *second edition, by Albert Deyarmond and Albert Arslan. Los Angeles: Aero Publishers, Inc., 1960. $5.75.*

Covers basic concepts of structural analysis with introduction to theories of different types of beams, trusses and columns. Numerous practical examples provided to make this volume of particular value to engineers in the aircraft and missile industries. Extensive appendix gives formulae, tables and graphs for ready reference.

Standard Plant Operator's Questions and Answers *by Steve Elonka and Joseph F. Robinson. New York: McGraw-Hill Book Co., Inc., 1959. Two volumes, 518 pp., 385 illus. Vol. I, $8.00; Vol. II, $8.00; 2-volume set, $14.95.*

Data show what county, state or city has license requirements for engineers, examination requirements, education, experience, class of licenses issued, various requirements, and the minimum boiler capacity requiring licensed operators. Covers all equipment needed to operate power services.

Nomography, *Second Edition, by A. S. Levens. New York: John Wiley & Sons, Inc., 1959. 296 pp., illus. $8.50.*

Thorough revision of entire text, with new chapters on circular nomographs and projective transformations.

Asbestos Its Industrial Applications *by D. V. Rosato. New York: Reinhold Publishing Corp., 1959. 214 pp., illus. $5.75.*

Guide manual to the industrial uses of asbestos in building materials, insulation, electrical and chemical equipment, etc. Covers types of materials available, their properties, and methods of manufacturing them.

Mechanical Refrigeration *Second Edition, by Norman R. Sparks and Charles C. DiIlo. New York: McGraw-Hill Book Co., Inc., 1959. 283 pp., illus. $8.00.*

Revises 1938 edition with new chapters on refrigerant compressors, refrigeration in air-conditioning, multiple evaporator systems, and heat pumps.

Analysis of Linear Systems *by K. Cheng. Reading, Mass.: Addison-Wesley Publishing Co., Inc., 1959. 431 pp., $8.50.*

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25-29 41ST ANNUAL CONVENTION AND WELDING EXPOSITION: American Welding Society, Biltmore Hotel and Great Western Exhibit Center, Los Angeles.

May 1-3 CHICAGO ELECTRICAL INDUSTRY: trade show and exposition, Lake Front Hall, Chicago.

1-4 AIR-CONDITIONING AND REFRIGERATION INSTITUTE: board and annual meeting, The Homestead, Hot Spring, Va.

3-5 1960 JOINT CONFERENCE ON CHURCH ARCHITECTURE: conference, Minneapolis, Minn.

9-12 INSTRUMENTATION SOCIETY OF AMERICA: second instrument-automation conference and exhibit of 1960, Civic Auditorium and Brooks Hall, San Francisco.

7-13 THE SOCIETY OF THE PLASTICS INDUSTRY, INC.: national conference and annual meeting, cruise on Queen of Bermuda.

11-16 WORLD DESIGN CONFERENCE: Sankei Kaikan, International Hall, Tokyo, Japan.

12-14 AMERICAN INSTITUTE OF ARCHITECTS: south Atlantic regionl conference, Winston Salem, N. C.

23-26 DESIGN ENGINEERING SHOW: Coliseum, New York City.

June 5-9 SOCIETY OF THE PLASTICS INDUSTRY, INC.: national conference, Hotel Commodore, New York City.

13-17 TECHNICAL WRITERS' INSTITUTE, eight annual meeting, Rensselaer Polytechnic Institute, Troy, N. Y.

15-18 BRITISH ARCHITECTS' CONFERENCE, Manchester, England. For information write F. R. Ricketts, Secretary, Royal Institutes of British Architects, 66 Portland Place, London W. 1, England.

20-22 AMERICAN SOCIETY OF REFRIGERATING ENGINEERS: annual meeting, Royal York Hotel, Toronto, Canada.

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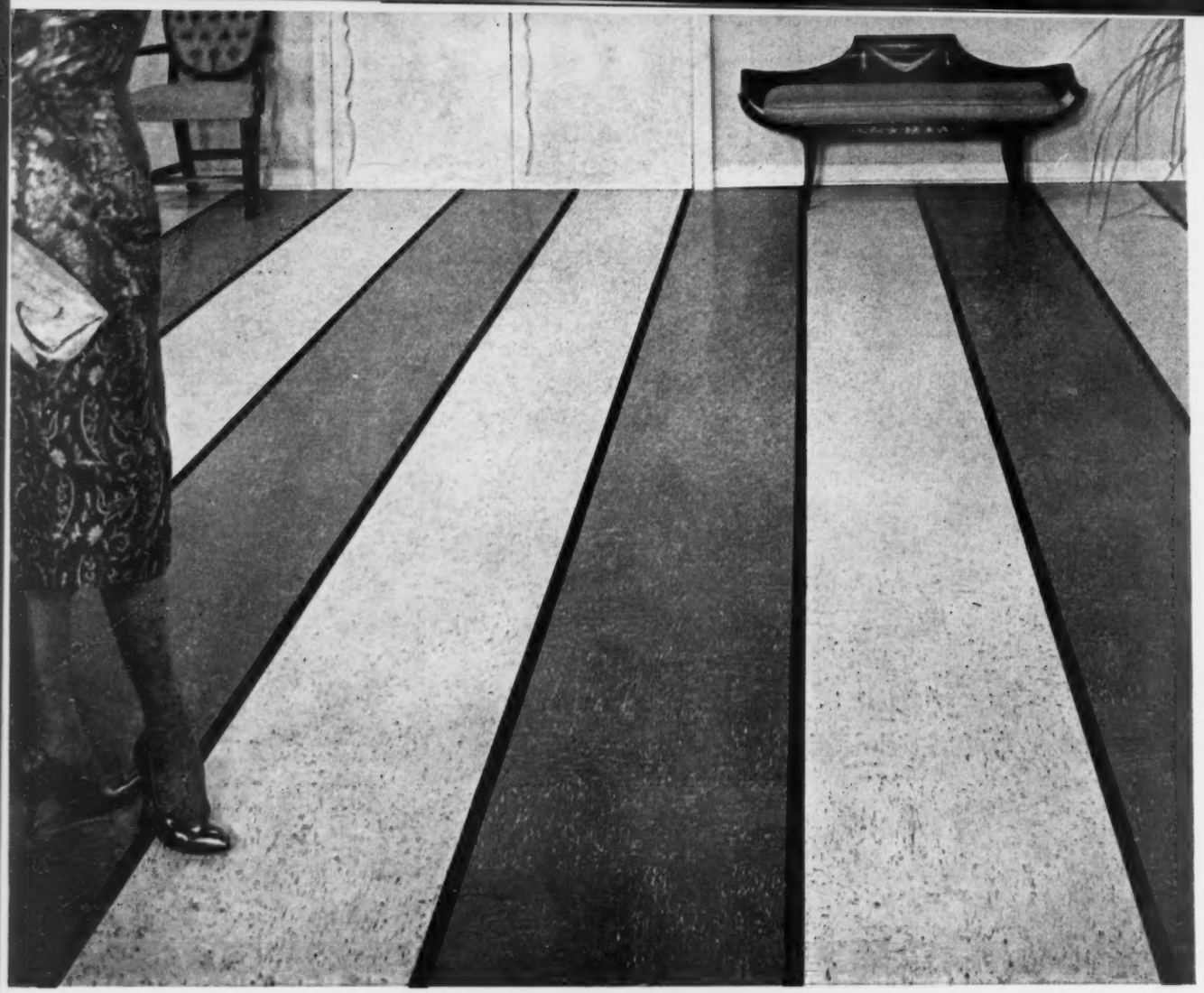

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